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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Safety in Chemical Works

As a competent authority indicates in this issue in his comprehensive survey of the subject of "Protection of Personnel and Plant in Chemical Works," the science of safety has already reached so high a level that the manufacture of chemicals—mysterious and perilous as it looks to the outside observer—can hardly be described to-day even as a dangerous occupation. This is a compliment equally to the employers and to the workpeople—to the former because of the scrupulous care they take to safeguard their personnel and plant against actual and potential risks, and to the latter because they intelligently recognise the benefit and the good intent of regulations which the unintelligent might resent as irksome limitations of their freedom. The gradual education that has brought this satisfactory condition about was perhaps even more necessary in the case of the workman than in that of the employer. The chemical manufacturer would require but a brief experience to make him realise the heavy financial loss—through damage to or destruction of plant and property or through personal injuries or loss of life among employees—that might follow the neglect of simple and inexpensive precautions. The robust workman of the older school, on the contrary, was apt to regard a certain contempt of danger as a mark of manliness, and his example made it difficult for younger colleagues to break away from the tradition he represented. Gradually this attitude has given way before the influence of intelligence, and the avoidance of unnecessary risk has become recognised as an indispensable element in good works organisation. The standard of health, personal competence, moral responsibility, and general works efficiency has been appreciably raised throughout the country.

All this vast organisation for the protection of workers and plant has been built up so gradually, and is now so much taken for granted in practice, that it is difficult to realise how complete it is, and how much labour and organisation the construction of the system has entailed. The official publications alone, of which a short bibliography appears on another page, constitute in themselves a "literature" on the subject. Some of the writers of these reports and pamphlets are still, perhaps, rather too disposed to use the most technical language at their command instead of the simplest possible terms, and here and there a little of the old aloofness and superiority may linger among the official class. But the general tendency is towards a more human and business-like attitude. In many cases now, the inspector's visit is welcomed as that of a friendly and competent consultant instead of a policeman in morning dress. Between the Government officials, whose duty it is to see that regulations are observed, company executives, and works managers and foremen, a good understanding has grown up, and the co-operation of the workmen themselves, through their committees, is a further valuable factor. All this co-ordination of effort for safety is bound to re-act with excellent effect on works organisation as a whole; efficient organisation and working of safety schemes usually co ncides with a high state of works efficiency generally. Outside official and executive action, a large and varied industry has been developed by the invention of mechanical safety devices and of those little handy contrivances by which ingenious minds anticipate unexpressed wants. There is scarcely any kind of mishap, from a works fire or explosion, down to a pin-prick, for which some provision has not been made in advance. And the care for the human worker is hardly more complete than the care for the mechanical apparatus through which he operates. The avoidance of waste, loss, disease, accident, damage, deterioration, and risks of every sort has, in fact, become a modern industrial science.

Attention is called, however, in the course of one

of the official publications, to the fact that it is not enough to tell the worker that a regulation has been devised for his particular safety. It must also be explained to him. When the skilled workman is informed in a notice of considerable length that he should take advantage of some precaution or other, it is not unnatural if he thinks that such an emergency is not likely to arise, and so does not pay attention to the suggestions offered to him. But if it is explained to him in an attractive way, why and how the danger arises, and is put before him it is found that he is only too ready to take advantage of the necessary safety measures. Experience at a well-known works, for example, has shown that discussions between managers and men on the conditions of work, especially in dangerous occupations, have resulted in unprecedented interest in such problems. So many practical suggestions have, in fact, resulted from the conferences that accidents have been reduced by 50 per cent. in the works in question. Another way in which safety precautions can be impressed is by the poster, designed with the object of summarising the cause and cure of accident. This field cannot be said to have been exploited to the full, however, and in the main the bills which are available for display in chemical works do not make the most of their opportunity. Too often such posters contain more matter than is necessary to serve their purpose, and so largely defeat their object, and the scenes they depict are of a depressing and sometimes repelling kind. On the other hand, the poster which is well drawn and contains a cheerful theme, illustrating the advantages to be gained by the observance of safety rules, is sure to attract attention, and such a bill, reproduced in another page from an American journal, is the kind of thing we have in mind. Instead of being shown the awful consequences of accident, the worker is presented with simple and attractive rules to enable him to carry out his work. The cheerful human element is introduced in this way, and while we do not hold a brief for the literary style of the "100 per cent." American poster, we suggest that similar methods of impressing safety measures might with advantage be used more widely in this country.

The Labour Factor in Costing

LAST week attention was drawn to the excellent policy adopted by the joint industrial council for the chemical industry of a joint inquiry by employers and workpeople into the possibility of avoiding wage reduction by means of better or more economical production methods. The importance of the trade union's participation in this matter is obvious, for naturally the inquiry will include the union regulations for labour as well as the policy of the management. There is a general impression that many of these regulations—adopted originally, it may be, for some definitely defensive purpose—may be operating against good workmanship and especially against a large output. Where, for example, they needlessly multiply or subdivide operations, where consequently they result in loss of time, where owing to excessive subdivision one section of workers is kept waiting by another section, especially where there is a deliberate limitation of the workers' output to some artificial standard below that of the man's natural capacity or desire—in all these cases obviously the effect is to add to the production cost and to raise the selling price. In these keenly-competitive days the success or failure of a business or even an industry may be determined by a slight difference in the figure at which the product can be placed on a competitive market. If a reduction in cost that may be necessary to save a business can be effected by the elimination of waste and the obtaining of the fullest value from every man and every machine, it would obviously be far preferable to the cruder remedy of wage-cutting. The experiment, therefore, in the chemical industry will be watched with great interest

One suggestion that has reached us is that the public, who are ultimately as much dependent on national industry as the employers and workers immediately concerned, are singularly ill-informed of the labour regulations in works, and that very little, if any, literature is available on the subject. While the present experiment is proceeding, it might not be desirable to discuss too publicly matters that the joint committee will have to investigate. At the same time, if any of our readers have actual experience which would throw light on the present system we should be very glad to publish them.

The Storage of Volatile Liquids

IT is only within late years that the serious magnitude of the loss which is incurred during the storage and handling of volatile liquids has been understood and drawn attention to by chemical engineers. In one way or another the majority of industrial chemists are concerned with the storage of these liquids, and although petrol and other petroleum fractions form the bulk of the substances dealt with, the same considerations apply to such products as benzol and the lighter coal tar fractions. Although the greatest losses probably occur during the filling and emptying of storage tanks, the losses occasioned by ordinary "breathing" are sufficiently large to be disconcerting. We have, too, on a previous occasion drawn attention to the fact that when evaporation losses take place the actual loss of volume is actually not nearly so serious as the loss of the fractions themselves, which, in order to bring the product back to selling specification, have to be replaced at considerable trouble and expense. In some cases, of course, it is more than probable that the incidence of evaporation from this standpoint may be overlooked, so that clients may quite unwittingly be served with a product that is not in conformity with the specification.

The factors that are responsible for evaporation are the renewal of air in contact with the liquid, the temperature of the surface of the liquid, the area of the evaporating surface, and the quantity of vapour in the air in contact with the surface. The work carried out has mainly been directed towards preventing the renewal of the air over the surface, one device for this purpose being the employment of floating roofs which reduce the vapour space practically to zero, and which are well worth considering in spite of one or two drawbacks which they involve. It would seem, however, that the most satisfactory solution of the difficulty which has yet been suggested is the equipment of all

tanks with "breather bags," which have lately been developed and described by four members of the staff of the Standard Oil Co. These bags are in reality nothing more than cylindrical balloons made of a closely woven cotton fabric and impregnated with a vapour-proof dressing, and they are connected direct with the vapour space of one or more tanks so as to inflate when the vapours are breathed out from the tanks in the daytime, returning the vapour to the tank in the cool of the night. In this way, accordingly, no fresh air is brought in contact with the stored liquid. The importance of the method is illustrated by the fact that when utilising these breather bags the average monthly evaporation loss was reduced (as shown by a series of careful tests) from 0·25 to 0·04 per cent. of the tank contents, or a saving, in the particular tank under test, of nearly 7,000 gallons per month. The method is an ingenious one, which might be well worth attention in this country, particularly as in all novelties of the kind it is necessary to establish a definite relation between the cost of the cure and the saving effected by reducing the loss of products.

The Case for the Dyestuffs Act

In his address on dyemaking before the members of the Dyers Company last week—the first, by the way, of an interesting series—Sir Max Muspratt put very simply the case for continuing the safeguards necessary for maintaining and further developing a British dyestuffs industry. For the purposes of peace and—if the emergency should ever unhappily arise again—for the purposes of war, the chemical and technical organisation involved in a successful dyestuffs industry is essential for the maintenance of national supplies, and this implies the personnel of a completely efficient school of organic chemistry. Sir Max is, as he stated, a Free Trader by tradition and conviction, but in this matter he feels that the security of essential national interests should be the first consideration. Professor G. T. Morgan added to this one very practical instance of how the colour using industry benefits from efficient home production. Three years ago, he stated, our dyestuff users were paying 25s. per lb. for a certain colour—one may almost take it for granted that it was a German product. The British Dyestuffs Corporation laid down a plant at Huddersfield at a cost of £80,000, and presently were able to produce this dyestuff at 12s. 6d. per lb., or at 8s. 4d. for large bulk orders. They were at once asked by the grateful beneficiary, "Why can't you do it for six shillings?" with the result that the plant had to be shut down and a number of workers dismissed. However, the work is again being done in this country and the colour is being sold at about 4s. to 5s. per lb. We have heard other instances of a similar kind mentioned from time to time. They should set the home dyestuff user, who grumbles at the price of home-produced dyes, reflecting how much more he might have to pay if the foreign producer recovered his former monopoly, and where he would have to look for his supplies in certain emergencies.

The rumour has recently been revived that the Government intend to withdraw from the British Dyestuffs Corporation, but on the condition that the company must not be allowed to pass under foreign control. What "foreign control" means exactly is not stated, but to be effective presumably it would include such an agreement as was recently contemplated with the German I. G. In this event the power of veto that the Government have the right to exercise would in effect remain as a permanent condition, and the Government would merely surrender or part on easy terms with its shares and cease to appoint direct representatives on the board of directors. For the exact terms, however, we must await the official announcement.

The Calendar

Nov.		
2	Society of Chemical Industry (London Section): "Taking Stock." C. S. Garland. 8 p.m.	Burlington House, Piccadilly, London.
2	Institution of the Rubber Industry (London Section): "The Plasticity of Unvulcanised Rubber." R. W. Griffiths. 8 p.m.	Coventry Street, Piccadilly, London.
2	Royal Institution: General Meeting of the Members. 5 p.m.	21, Albemarle Street, London, W.1.
3	Mineralogical Society: Anniversary Meeting: "The Dissociation of Dolomite." C. S. Garnett. "A New Refractometer." B. J. Tully.	London.
3	Society of Chemical Industry (Birmingham and Midland Section): "The Behaviour of Sulphur Dioxide in Acid Solutions." Dr. W. Wardlaw and S. R. Carter. 7.15 p.m.	The University, Birmingham.
3	Society of Chemical Industry (South Wales Section): "Vitamins." F. J. Dyer. 7.30 p.m.	Technical College, Cardiff.
3	Institute of Metals (Birmingham Section): "Some Notes on the Properties of Nickel-Silver." W. C. Gray and R. E. Ansell. 7 p.m.	Chamber of Commerce, New Street, Birmingham.
3	Institute of Metals (N.E. Coast Section): "Methods and Uses of Metallography." Dr. J. A. Smythe. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
3	Hull Chemical and Engineering Society: "Physiological Fitness." Professor H. S. Raper. 7.45 p.m.	Grey Street, Park Street, Hull.
4	Society of Public Analysts: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London.
4	Society of Public Analysts: "The Determination of Palm Kernel Oil and Butter in Margarine." G. D. Elsdon and Percy Smith. "The Determination of Alcohol and Ethyl Chloride in Chloroform." Clive Newcomb. "The Volumetric Determination of Soluble Sulphates by Means of Barium Chloride and Potassium Stearate." H. Atkinson. 8 p.m.	Burlington House, Piccadilly, London.
4	Society of Chemical Industry (Nottingham Section): "An Investigation of the Nature of Wool Protein." S. R. Trotman, E. R. Trotman, and R. W. Sutton. "The Sulphur Content of Wool." S. R. Trotman and H. S. Bell. 7.30 p.m.	University College, Nottingham.
5, 12, 19, 26.	Chelsea Polytechnic: Series of Lectures on Metal Crystals. Professor H. C. H. Carpenter. 8 p.m.	Chelsea Polytechnic, London, S.W.
5	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, London.
6	Society of Chemical Industry (Manchester Section): "Long Chain Molecules." Sir Wm. H. Bragg. Arranged jointly by the Manchester Section of the Institute of Chemistry, the Society of Dyers and Colourists, and the Manchester Literary and Philosophical Society. 7 p.m.	16, St. Mary's Parsonage, Manchester.

Protection of Personnel and Plant in Chemical Works

By Rex Furness

In the following article, our correspondent gives a general survey of the dangers to which workers are liable to be exposed in chemical works and of the methods and apparatus needed for protection against them. Without going into excessive detail, he lays down certain broad principles of safety policy, leaving them to be adapted, at the discretion of the responsible authorities, to the varying conditions in works of different size and character. The very small percentage of actual injuries that occur in proportion to the potential risks involved indicates the high level at which safety organisation is maintained by British chemical manufacturers.

THE manufacture of chemicals, involving as it does the use of strong acids and alkalis, inflammable vapours and gases, toxic substances and potentially dangerous materials, high temperatures and pressures, and so forth, can yet scarcely be ranked to-day as a dangerous occupation. The general application of safety methods has, indeed, resulted in the reduction almost to vanishing point of the number of serious or fatal accidents. Further, the economic soundness of the policy of protecting plant from the attack of corrosive media and the like has been largely realised by the manufacturer, who pays as much attention to conditions likely to injure his plant as to those affecting his employees.

Three Main Factors

Nevertheless it is well that attention be given to the whole matter, for, under the stress of executive and administrative routine, the chemical manufacturer assumes too frequently that familiarity which breeds contempt of danger. Again, there do exist dangerous conditions which are not fully envisaged in the normal run of a day's work, but which have only to be realised in full import for the necessary precautions to be taken. The relative freedom from serious accident amongst chemical workers in normal times is sure proof of the determination of executives to leave nothing undone in order to ensure the safety of employees, and this being granted, the question of protection can be broadly resolved into several factors.

Firstly, the realisation that danger is never too far away and may assume many forms must be complete and absolute.

Secondly, there must be available the means for combating dangerous conditions—fire-fighting appliances, gas masks, protective clothing, general safety equipment, established and carefully thought out codes of procedure in specific circumstances, and, for the plant, protective paints, special construction materials, etc.

Thirdly, men must be taught to appreciate and use whatever is provided for their protection.

The last is by no means the least important consideration. Chemical workers are often strangely loth to take that slight extra trouble and inconvenience which is frequently demanded for full safety to be assured. This is too often due, not to familiarity, but to a lack of sound knowledge of the why and wherefore of what may be regarded as irksome inconveniences. The education of workers will bear as fruitful results in the matter of "chemical" safety as have been observed in the "safety first" movement. The curious apparently innate determination of the worker who, told to "keep off the grass," longs for nothing better in the world than to walk on it is reflected in his overpowering desire to smoke just in that one place where it is most dangerous so to do. He is a sensible being, however, and will accede to reason based upon knowledge, when "verboten" notices in letters a foot high will leave him cold. Safety in chemical works can only be assured by complete reasoned co-operation on the part of the worker.

It is the purpose of this article to indicate in a general way some of the potential dangers that exist in chemical plants, to emphasise those less well known and more subtle in their incidence, and to note some of the safety appliances, which are available in profusion. Protective measures against what may be termed mechanical dangers by means of fences, guards, aprons, and the like will be left with mere reference, for there is little if any disregard of the sensible demands of the Factory Acts.

Chemical Fumes, Poisonous Gases, etc.

It is now possible to ensure protection against all dangerous fumes, gases, etc., for absorbent materials have been highly developed, and gas masks produced in convenient forms. One absorbent will not prove a universal safeguard, but it is possible to fit masks with specifically absorbent substances. One general protective mask at least is available which contains cotton wool for removing dust, alkali to remove acid gases, calcium chloride to effect dehydration, active charcoal which removes a large variety of organic vapours, etc., an inorganic gel with high absorptive properties, and a catalytic material for the conversion of carbon monoxide to the comparatively harmless and readily absorbable dioxide.

Where the danger is specific and known, the task of providing a safety mask is simplified, and one maker's type of canister or army box type of breathing apparatus has now been approved for use against low concentrations of gases such as are met with in chemical works. Different absorbent canisters are used for different classes of gas, and each canister bears (1) the date on which it was filled, (2) the kind of gas against which it is active, (3) the length of time for which it is effective against the gas for which it is designed.

The respirator consists of a face piece or mask connected to a canister filled with an appropriate material. It is also provided with a non-return outlet valve for the expired air, and it is easily fitted and not irksome to wear. It cannot be emphasised too strongly that thoroughly reliable masks be used, and that attention be paid to the capacity of the charge of absorbent material.

Let us assume that dangerous gases and vapours in chemical works are guarded against by suitable masks, and consider as a specific example, perhaps less well known, the danger of chlorine, which is being increasingly used in a score of industries following its large scale production and sale in the form of liquid chlorine. The use and storage of liquid chlorine involves the risk of accidental leakage. If such an escape occurred in an enclosed space, the latter would soon be full of the gas in considerable concentration in the air. Respirators containing absorbents might prove effective if only required for a short time, say, for the discovery and remedy of the leak, but it is important that self-contained breathing apparatus such as is used in mine rescue work be available. Moreover, safety apparatus should be at hand at several points, so that drifting of the gas in any particular direction would not entail the isolation of safety apparatus which might have been placed in the particular direction of the gas drift. At least one case of this kind has been reported, but fortunately no fatalities resulted.

Protection against Carbon Monoxide

Carbon monoxide is an insidious poison, present in many circumstances and giving little warning of its presence. With the development of synthetic ammonia works, where hydrogen is produced from water gas, and the appearance and probable extensive development of processes for the conversion of water gas into synthetic motor fuels, the need for watchfulness against carbon monoxide increases. It is now readily possible to detect and estimate small quantities of carbon monoxide by means of the compound "Hoolamite," which is a mixture of iodine pentoxide and fuming sulphuric acid deposited upon granular pumice. This material forms an unstable greenish coloured compound, when reduced by means of carbon monoxide, very small quantities of which can be detected and estimated by comparing the colour produced with definite standards. Two types of portable apparatus have been described for use in suspected atmospheres (*J. Ind. Eng. Chem.*, Sept. 1921, p. 770). A layer of activated charcoal removes all reducing gases likely to interfere with the test, so that the apparatus gives surprisingly accurate results.

Gas masks containing a compound which specifically oxidises the monoxide to the dioxide are available. A mixture of highly active oxides of manganese and copper and occasionally other metallic oxides, and known as "Hopcalite," has been found to be effective against very low concentrations

of the gas, provided it be dry, so that it is a simple matter to construct a satisfactory breathing apparatus.

The treatment of persons suffering from carbon monoxide poisoning should be immediately and carefully applied, and full details of symptoms, first aid methods, procedure for inducing artificial breathing are given on a poster which has been published by H.M. Stationery Office, price 2d.

It is particularly pointed out that on the appearance of the first symptoms of poisoning the patient should be moved at once to fresh warm air, and that exposure to cold should be avoided, whilst artificial breathing should be induced by the prone pressure method.

Means for administering oxygen are unsatisfactory in many cases, and special attention should be paid to this part of the first aid equipment, which is available from several sources. It may be pointed out, too, that the simultaneous administration of carbon dioxide with oxygen has given beneficial results. Dr. Henry Forbes states that the use of oxygen as an antidote to carbon monoxide poisoning can be materially improved by the admixture of carefully regulated quantities of carbon dioxide. Experiments upon dogs showed that the recovery from the effects of the gas took two hours when no treatment was applied, from 60 to 80 minutes when oxygen was administered, and only 20 minutes when oxygen mixed with carbon dioxide was given. The application of the principle has proved so satisfactory that apparatus for the administration of the oxygen-carbon dioxide mixture has been fitted as standard first aid equipment in many large gas works.

There is upon the market a substance that is claimed to be a specific against carbon monoxide poisoning. It is applied as a subcutaneous or intramuscular injection in quantities of 3 to 10 m.g. In critical cases it may be applied intravenously in amounts not exceeding 3 m.g. Prevention is better than cure, however, and prevention is possible in almost every case. Failing this, correct first aid treatment according to the directions already referred to should prove effective, but care and competence should be in evidence.

Stills, Autoclaves, etc.

Many accidents have occurred in the past due to lack of safety devices upon autoclaves, but there should be no excuse for this nowadays, for safety valves or other devices can be fitted even in the most difficult of conditions. Last year, for example, a fatal accident occurred during the distillation of carbon disulphide. Owing to the corrosive action of this chemical, it had not been found possible to fit a safety valve of the ordinary type and reliability. A water seal was fitted. The plant was in an exposed position, and during a spell of severe weather the water froze. An explosion occurred with spontaneous ignition of the disulphide, and the operator of the still received fatal burns. How easily, with a full sense of the potentiality of ever-present danger, would it have been to have installed a steam inlet pipe to the still passing around the water seal and thus prevented freezing. The incident is significant, and illustrates the necessity of unrelaxing vigilance and thought on the lines of safety measures.

Many accidents have occurred during still-cleaning operations. In the case of tar stills, for instance, an extremely careful examination should be made, checked, reported, and witnessed.

Education of Workers

A fatal accident which occurred last year illustrates the point made in the introduction to this article relative to the need for education amongst the workers and the creation of a deep impression of likely danger in their minds. The accident in question would probably not have had a fatal termination if the workman who attempted a gallant rescue of a comrade, and who also lost his life, had paused to put on the necessary equipment. In another instance, the foreman relied solely upon his sense of smell in order to ascertain whether the atmosphere in the still were sufficiently pure for work of cleaning to be commenced. A chemical test should, of course, always be applied. Further, a plan which might well be adopted in these cases is to provide a supply of compressed air for introduction into the still, and stills might be fitted with a wide manhole at the bottom and connection made to a similarly wide extension pipe. Ventilation and a means of more ready escape would thus be ensured.

Precautions against splashes of corrosive liquids need mere mention, but it may be noted that acid proof clothing is upon the market. A Manchester firm supplies a cloth which resists the action of strong sulphuric acid, ordinary hydrochloric acid, nitric acid, 40 per cent. caustic soda, etc. Workers' garments of various types may be obtained in this material.

Injuries to the eyes may be largely countered by the provision of bottles containing suitable eye wash liquid in all dangerous places.

First Aid

It is self-evident that efficient first aid in the case of accidents will often prevent serious developments, and it is therefore impossible to over-estimate the value of an effective first aid organisation in chemical works. Smaller works find it impossible to employ trained nurses and doctors, but this is no reason why first aid treatment should not be available in a high degree. The type of work appeals to many, and training upon accepted lines is readily available. A band of trained workers, whose times and locations can be so arranged as to ensure immediate attention to any injured person, can be created, and the writer knows of many works where the service rendered is of extremely high order and efficiency.

Sympathetic approval and appreciation from executives is often all that is needed and, as in many other instances, the element of competition fostered both *inter* and *intra* works is a great stimulus. The first aid service should be available at all hours, and be equipped with everything that is necessary. The writer has no hesitation in saying that he owes his life to the extraordinary service rendered by first aid workers who, following a disastrous explosion, were immediately on the spot, and under the most difficult of circumstances which can be imagined succeeded in rendering just that treatment without which the months of highly skilled attention given later would have proved unavailing.

It is impossible to enter into details with regard to specific treatment of burns, wounds, asphyxia, acid and alkali burns, etc., or to indicate the many types of first aid equipment that can readily be obtained. Attention may be called, however, to "First Aid and Ambulance at Factories and Workshops," published by H.M. Stationery Office at 7½d. The idea of effective first aid organisation being accepted with enthusiasm, it is not difficult gradually to organise and maintain a service which will work wonders.

Fire-Fighting Equipment

As in the case of first aid service, it is often impracticable for chemical works of relatively small size to organise a full fire-fighting service. Much "first aid" work can be looked for here, however, and the provision of extinguishers need not suffer on the score of unavailability. It is not proposed to enter here into details of fire-fighting methods, but it is strongly urged that it be made one man's job to superintend all equipment, and to be responsible for maintaining all apparatus in full working order. A thoroughly reliable system of alarms, fire drills, and education will prevent small outbreaks of fire from assuming disastrous proportions. The provision of fire-fighting equipment, some types of which are now to be briefly indicated, is relatively cheap, and the policy of "penny-wise-and-pound-foolish" cannot be condemned too severely. Insurance companies are only too willing to assist their clients in all matters concerning fire prevention and attack, and much greater use might be made of their help.

Many types of portable extinguishers are on the market—carbonated water type, carbon tetrachloride type (which should be used with care on account of the vapours that are generated), carbonated foam or froth type, and so forth—and almost extravagant installation of these first-aid means is justifiable. Frequent examination and periodical recharging should be set apart as the duty of one or more responsible employees.

The "Foamite" type of extinguisher, made in many varieties and sizes, has proved of great use in chemical works, for it is capable of dealing with many fires which cannot be countered by ordinary methods involving the use of water alone. Thus, burning solvents often float upon the surface of water and spread the conflagration. By the use of this type of fire-fighting equipment, a foam charged with carbon dioxide, which is lighter than the lightest solvent, is produced readily and simply. Two reacting solutions, such as aluminium

sulphate and sodium carbonate, together with a foam producing and stabilising constituent, yield a foam many times as bulky as the solutions generating it. This foam provides a suffocating blanket which has proved of incalculable value in unnumbered instances.

Following upon the ordinary type of elaborated jet devices a sprinkler type has been brought out. The heads are of the well-known Grinnell type, so designed that the two chemicals mix in the particular head or heads over the fire, being simultaneously released upon the fusing of the strut by the heat of the fire. The two streams of chemical solution are thoroughly mixed by the peculiar construction of the heads, and the resulting foam showers down upon the fire below.

A single instance of the effectiveness of foam extinguishers may be given. A serious fire which occurred in a large oil works raged for twenty-four hours, all attempts to extinguish the blaze being useless until the chemicals from a foam fire-fighting system were pumped into railway tank waggons and transported to the scene of the fire. With the aid of improvised pipe lines the liquids were driven through a hose for about 300 yards on to the burning tanks of oil, and the fire was extinguished in a few minutes.

Reference may briefly be made to sprinkler systems of the ordinary water supply type. The Grinnell automatic sprinkler and fire alarm, manufactured by Mather and Platt, has the remarkable record to its credit of over twenty-five thousand fires extinguished with an average loss to the insurance companies, through both fire and water, of only about £60 per fire. It is, therefore, comprehensible that insurance companies grant considerable reductions in premiums in those cases where approved sprinkler apparatus is installed.

Finally a reference may be made to a valuable article on "Fire Dangers in Factories and their Causes," by T. H. Gant, Danger Building Officer at H.M. Factory, Gretna, published in THE CHEMICAL AGE (Part I on April 24, 1920, and Part II on May 8, 1920). Spontaneous ignition, ignition of fibrous materials impregnated with oil, inflammable liquid dangers, and many specific causes of fire are dealt with, and much useful information is given. The danger from ignition of inflammable liquids flowing through pipes from static electrical sparks—a subject which, although very important, must needs be passed here with mere mention—is also considered in this article. At a voltage of 500 a spark may be generated, and it has been shown that ether, flowing through an iron pipe at a rate of two metres per second, may develop a potential of well over twice this voltage. Protective measures such as thorough earthing, etc., have been devised, and details are readily available.

Dust Explosions

The dust hazard in industry has been dealt with recently by Gibbs, whilst the present writer stressed the danger and pointed out precautionary measures in this journal last year. It is unfortunately only too true that the risk from dusts is not fully realised in this country, possibly by reason of the comparative immunity from serious occurrences which we have enjoyed. None the less, the many disastrous explosions which have taken place in the States, with appalling loss of life and property, should make an appeal to thoughtful executives. Organic dusts of many varieties—sugar, flour, starch, wood, grain and cereal dusts, etc.—and inorganic dusts such as aluminium, sulphur, etc., are potential causes of explosion.

Fine dusts expose an enormous surface to the supporter of combustion, air, and the aerosol may approach the nature of an explosive *gas* mixture, capable of ignition by electric sparks, open flames, sparks generated by friction, etc. The combustible mixture, ignited at one point, readily propagates the explosion wave, and disaster ensues. Combustible dusts should never be allowed to accumulate upon walls, beams, etc., and careful attention to suction cleaning should be given. The absence of sources of ignition, open flames, electric sparks, etc., should be ensured, while the introduction of "damping down" materials such as water, inert dusts, etc., should be made, if at all possible.

In grinding operations where dust gathering can scarcely be avoided iron impurities that are likely to strike sparks during grinding operations should be removed by magnetic separation, and electrical equipment should be isolated. A further absolute safeguard can often be applied economically in the shape of the introduction of an inert gas, cheaply produced in available apparatus, into the air space, so that the oxygen concentration in the mill, elevator, etc., is below the minimum necessary for the propagation of explosion.

The dust hazard is very real and cannot adequately be discussed in this general article, but reference may be made to the writer's article already noted.

The reduction of the fire risk to a minimum is a matter of common sense and forethought only, for the manufacturer of fire-fighting equipment is at hand with advice and proved methods and means.

Protection of Plant from Fumes, etc.

The metallurgist to-day supplies a variety of acid-resisting metals and alloys, and many have indubitable proof of their efficacy and economy. With rustless steels and irons, chromium and nickel-chromium alloys and steels, Monel metal and many others, it is impracticable to deal at length, whilst ceramic wares in chemical plant designs are ever advancing in variety, importance, and reliability. New compounds for the construction of acid vats and similar apparatus appear from time to time with convincing details of their value.

Ironwork of various types may be made resistant to the action of corrosive fumes by galvanising, colorising, sheridising, spray coating, plating, resistant metal attachment, glass and related enamelling processes and similar operations, which again must be passed with mere reference.

Protective paints may, perhaps, be given a slightly more detailed consideration, for their use involves no more than the ordinarily expected charges for painting. Their application to existing structures is easy, and the results of the use of many available varieties are eminently satisfactory, provided that the necessary care be taken in their application and that the economy axe be held not too near the operation in hand.

Responsible manufacturers of protective paints do not claim that their products are universal cure-alls, and they are prepared to give advice founded upon practical experience. It is well, too, to try out preparations upon a series of exposed plates and to form a judgment upon the behaviour of the materials under specific conditions.

Bituminous and Micaceous Iron Paints

Bituminous paints are available in a wide choice and have proved very useful as corrosion prevention means. The paint should have a reasonable content of high quality bitumen, and should contain a first class base, so that a tenacious, permanent film is readily formed. A new paint, which has had remarkable success in specific instances and which has many general possibilities, contains 40 per cent. of bitumen, ground in oil to form a colloidal solution. It may be applied to steel or wood, and even at temperatures of nearly 400° C., continuous, it has proved effective in preventing corrosion from gas and acid fumes. It dries rapidly after application and does not blister even at raised temperatures. It does not crack, for, being so intimately in association with the metal surface, it expands and contracts with the structure.

Bituminous paints are not the sole representatives of anti-corrosion media; as an instance of another type, the micaceous iron paint may be noted. Essentially a peroxide of iron, the material in the paint protects iron, steel, galvanised iron, timber, etc., from the effects of atmospheric conditions, fumes, etc. The peroxide is incapable of further oxidation and consequently destruction of the paint film does not occur. It is claimed to be elastic and responsive to temperature changes affecting the structure, so that cracking and stripping are avoided.

The effects of corrosion of structural ironwork are well known, but are often passed over glibly as unavoidable "maintenance charges." In many cases this is unnecessary, and experiments with the best types of anti-corrosion paints may result in surprising savings. Paints are available which afford a substantial measure of protection against weather, acid fumes, alkalis, heat, cold, and damp.

A word may be said as to the fireproofing of wood. This is better done, of course, before the structure is erected, and various impregnating chemicals forced into the wood under pressure have surprising results. Protective paints or coatings cannot afford absolute protection of a material such as wood, but their application is well worth while. Ordinary white-washing

is cheap and a measure of protection results, although it will not prevent the burning of wood exposed continuously to a high heat. Numerous patented fire-retarding paints are available, whilst an effective outdoor paint consists of linseed oil, zinc borate, and chrome green. This paint has been shown to retain its fire-resisting properties through over three years of exposure to the weather.

There are available several kinds of non-inflammable materials of construction, roofing, etc., which have been severely tested. Combinations of asbestos and cement, asbestos protected metal, and similar materials are readily available. It may be invidious to particularise, but excellent results are achieved by the use of "Cellactite," which is a substance of remarkable strength and tenacity, waterproof, and resistant to corrosion due to the atmosphere or chemical fumes. It is available in the form of tiles, corrugated sheets, fittings for interior work, etc. "Uralite" is a proven fire-resisting sheeting and is proof against acids.

The problems associated with the prevention of injury to personnel and plant in chemical works can be and are being largely solved, but the price of success—a small price relatively—is careful and continued thought.

The Health and Safety of Chemical Workers

Suggestions from Official Reports

We reproduce below some typical notes on the health of chemical workers which we have abstracted from Official Memoranda and Reports administered by the Home Office, together with a brief bibliography of safety literature published by H.M. Stationery Office.

Safety Committees in Works

For many years a great amount of attention has been given by the Home Office to the fencing of machinery and the provision of safeguards against accidents in general, and considerable advances have been made in preventing the more serious classes of machinery accidents. Nevertheless, in spite of all the efforts that have been made the yearly roll of industrial accidents is still a long one and machinery accidents due to carelessness or neglect on the part of officials and workers alike to maintain or use the guards provided are of daily occurrence. It is perhaps not generally realised that machinery is responsible for only a minority of the accidents which occur in factories and workshops. The Home Office records show that more than two-thirds of such accidents are due to other causes. The annual reports of the Home Office Inspectors regularly show that a great number of accidents are due simply and solely to carelessness, inattention, and want of thought. It has been estimated that the percentage of avoidable accidents in some industries is as much as 60 per cent.

There is no doubt that a large reduction in the number of accidents would be brought about if managers, officials and workers in factories were determined that avoidable accidents should be prevented and would co-operate in taking the steps necessary to prevent them, and the following description of what has been done in a large factory in the North of England is given in order to show, by a concrete example, the kind of methods which may be adopted for the purpose. Departmental Committees were established some years ago in the works with the primary object of encouraging the workpeople to make suggestions with respect to their work or conditions of employment. Each committee was composed of a certain number of employees nominated by the firm and an equal number elected by the workpeople themselves. It was found that many useful suggestions were received with regard to the guarding of machinery and other safety devices.

Inquiry into Accidents

This step led on to the formation of Accident Inquiry Committees, similarly constituted, for the various departments of work. Their chief duties were (1) to inquire into and report on all accidents that occurred in their departments and to make recommendations, if possible, to prevent their recurrence, and (2) to nominate quarterly two members to make regular inspections of the departments along with the department manager and a foreman, to point out defects, and to make such recommendations for the prevention of accidents as they considered desirable. This system of inspection was found to be of great practical usefulness, and the reports of the committees on the accidents investigated had an excellent effect on the workers, especially in those cases proved to be due to carelessness or negligence. The workers' representatives retire after six months' service and are not eligible for re-election for a further period of twelve months. In this way a large number of the workers in each department are trained in the way of accident prevention and acquire the "safety" attitude, and their example and influence have very beneficial effects upon their fellow-workers. At the same time an ambulance or First Aid brigade was established, the members of which were selected from the various departments and thoroughly trained in First Aid work. They wear a distinctive badge, and in order that they may keep up to date they are re-examined in First Aid work each year.

In the view of the firm, the education of the worker is the main factor in the reduction of preventable accidents. It is no use merely *telling* workers to be careful. They must be shown how to avoid accidents; they must be made to understand that the employers are in earnest in their intention to prevent accidents, and in every possible way the safety attitude must be inculcated. At the same time, the sympathy, help and co-operation of the management, and the officials and foremen, are essential to the development of "safety" principles and practice, and must be actively promoted by the employer if success is to be attained. The result of these new measures has been in a single year to reduce the number of accidents in the works by more than 50 per cent.

Industrial Lead Poisoning

Industrial plumbism is practically always the result of inhalation and absorption, from either the alimentary or pulmonary tracts or both, of dust and fumes. Uncleanliness and carelessness on the part of the worker are contributory causes. The susceptibility of women to the influence of lead is usually accepted as being greater than that of men. Figures in the pottery industry seem to show that women are about twice as susceptible as men, but this may be due either to the relatively greater danger in the processes in which women predominate, or to their average shorter duration of employment. The records of plumbism show that two-fifths of all reported cases occur during the first eighteen months of employment.

A blue line on the gums by itself indicates rather the presence of lead than lead poisoning, but as a danger signal and as affording confirmation of other symptoms it is a valuable sign. Presence of a marked blue line in a workman will at once show that not only he himself, but all his fellow workers in the particular process, must be running grave risk from fumes or dust containing compounds of lead, that poisoning must have occurred in the past and will certainly occur in the future, and that if work has been continued for years under these conditions constitutional effects on the circulatory and excretory system must have gone far. In many instances such a line would be lessened or removed by cleanliness of the teeth, without changing conditions of exposure to the lead.

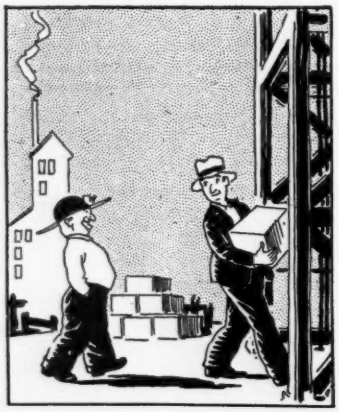
The first action of lead when absorbed into the system is on the blood and circulatory system, causing anæmia. Facial pallor, due to interference with the nerve supply of the blood vessels is frequently noted. Among males anæmia is comparatively rare, and its significance when associated with loss of subcutaneous fat, particularly noticeable in the eye region in the face of a lead worker, is consequently greater. In lead workers, more particularly in men, there is sometimes developed a special type of anæmia, with glistening of the eye, suggesting organic disease of the heart which, however, does not necessarily co-exist.

Lead poisoning from breathing the dust given off in dry rubbing down is the main occupational risk among painters.

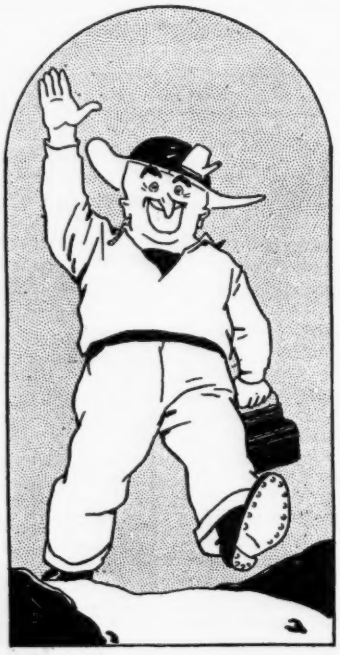
(*Continued on page* 443)

How Safety is Taught in American Works

In the United States "safety" is treated almost as a science, and the folly of needlessly risking life and property is everywhere emphasised. In connection with the National Safety Council, "safety weeks" are organised in the cities and large industrial centres, competitions are encouraged between works, and the principles of safety are taught by means of classes, press publicity, libraries, pamphlets, leaflets, etc. Apart from this public work, individual firms through their house journals and in various other ways give considerable attention toi the instruction of their workpeople in safety methods, and insst on the use of safety appliances as essential in works organisation. The following cartoon page, taken from the October issue of *The Explosives Engineer*, the monthly journal of the Hercules Powder Co., of Wilmington, Delaware, illustrates very well how the moral is insistently impressed on workers who are engaged in dangerous occupations.

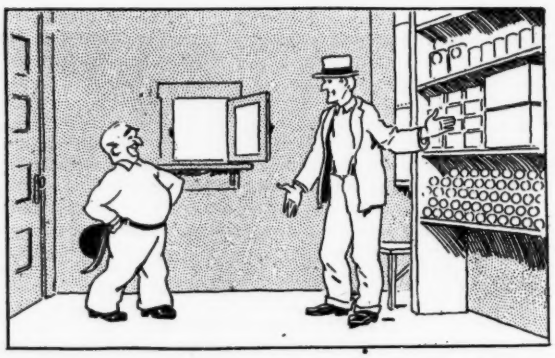


NEVER LOAD THA CAGE WI' POWDER, DICK, UNTIL ALL THA SHIFT BE LOWERED — COORSE I NAWS THEE WONT TAKE BLASTIN' CAPS ON SAME CAGE WI' POWDER —



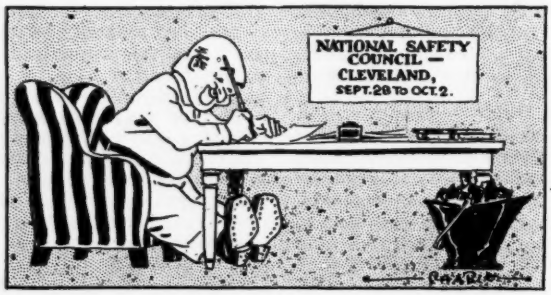
FROM NOW ON, JIM, — WHEN 'AULIN' EXPLOSIVES IN THA POWDER CAR, ALWAYS 'AVE A BLOOMING H'ESCORT AHEAD WAVIN' THIS 'ERE RED LANTERN.

ÓSCAR, I'M PLEASED TO SEE THEE 'ELPING US TO WIN THA SENTINELS O' SAFETY TROPHY BY CARRYIN' DYNAMITE UP STOPE IN CANVAS SACK —



IT DO MY 'EART GOOD, MAC, TOO SEE THEE DISTRIBUTIN' CAP CRIMPERS — AFTER THIS, ANY MAN CAUGHT CRIMPIN' WITH HIS TEETH — GOES DOWN THA HILL.

NAOW, I MUS' WRITE TO BLASTER BILL — 'EEL BE GLAD TO NAW BAOUT ALL WOT'S GOING ON, AND IN PARTICULAR THAT SO MANY MINERS 'ERE 'AVE BEEN READING THA BOOK ON "SAFETY IN THE USE OF EXPLOSIVES" EE SENT US.



WHEN I SEE THEE IN CLEVELAND, BILL, AT THA NATIONAL SAFETY COUNCIL CONVENTION, I'LL 'AVE 'EAPS O' THINGS TO TELL THEE BAOUT 'OW WE BE KEEPIN' CHAPS FROM 'URTIN THEIRSELS — AND OTHERS.

(*Continued from page* 441)

The symptoms in the painter are usually colic and constipation, and, less frequently, "drop wrist" (loss of power to extend the fingers and wrists), although painters seem to suffer from this form of paralysis rather more than lead workers do in general, presumably because of the special strain the work places on the forearms. Wrist drop will always incapacitate a man for months and may prove permanent unless electrical treatment is obtained in time. After years of work the constitution may become undermined from the slow action of lead on the blood vessels and kidneys (chronic Bright's disease). It should be remembered that these symptoms in the painter follow only on breathing in dust. What happens is that the dust sticks on the moist surfaces inside the mouth and is either swallowed or passes into the air tubes. One breathes 16 times a minute, and in and out the dust goes, but always a little less out than in. So long as paint ready mixed with oil is used, and in a cleanly way, painting operations involving no dry sand papering ought to be harmless and not give rise to any poisoning, and one may be quite certain about this.

Protective Clothing

THERE are three particular types of clothing for women workers in chemical and allied works which are recommended in a pamphlet prepared by the Home Office on this subject, from which we reproduce the accompanying photograph.

TYPES OF CLOTHING

Type A.—Overall dress and cap, or similar suit, with no outside pockets, the sleeves to fasten closely at the wrists. This dress will, as a rule, be suitable wherever the work is dusty or dirty, or where women are employed on or near machinery not of a specially dangerous character. It is recommended for use in the following processes :—dry tanning, general gas works practice, glass handling and mixing, aluminium manufacture, engineering work, metal moulding and painting.

Type C.—Overall dress or trouser suit of woollen material, cap, leather apron, high-topped waterproof boots, and rubber gloves. This outfit is required in cases where there is exposure to acid or alkali, and is also recommended for bleaching, battery house work (cleaning and preparing accumulators and the metallic processes), galvanising and pickling.

Type D.—Overall dress or suit, cap, apron of waterproof material such as rubber, oilskin, mackintosh or leather, and high-topped waterproof boots, or leggings or puttees covering the open tops and lace-holes, or clogs. This dress is recommended for use in acid work, ammonium nitrate, phenol, tanning and oiling skins, coke washing, glass grinding and polishing, dyeing, electro-plating and metal grinding.

Gas Poisoning Regulations

Symptoms and Treatment

THE effects of gassing (apart from headache, giddiness, pain in the stomach and smarting of the eyes) are feeling of loss of power and difficulty in breathing. The general treatment prescribed is as follows :—The patient should be removed into the fresh air and clothing loosened at waist and neck. Keep him lying down and cover with a blanket to keep warm. Stimulants should not be given. When a patient is able to swallow give hot coffee. If breathing is weak or has stopped, artificial respiration and oxygen should be given.

Artificial Breathing

To apply artificial breathing place the patient face downwards, kneel astride of the patient and place the hands flat out on each side of the body over the lowest ribs. Then promote artificial breathing by leaning forward over the patient, and without violence, produce a firm, steady, downward pressure. Next release all pressure by swinging one's body backwards without lifting the hands from the patient. Repeat this pressure and relaxation of pressure, without any marked pause between the movements, about fifteen times a minute, until breathing is established.

Chemical Burns

Burns of the skin should immediately be flooded with clean water, and then covered with a burn dressing from the first aid box. To treat burns of the eye wash out the eye by gently blowing a steam of water from the eye-wash bottle, or immerse the face in a basin of clean water and open and shut the eyes. Then report to a doctor immediately. Splashes of anilin or nitro-benzene can enter the system when they touch or wet the skin, therefore if the clothing is splashed sufficiently to wet the skin the clothing should be removed at once and the skin washed well.

Bibliography

The publications dealing with safety in chemical and allied works given in the following list are selected from the literature published by H.M. Stationery Office, Kingsway, London, W.C.2, and are recommended for reference where further details are required.

	Official No.	Price. s.	d.
Hoists: Precautions in the Installation and Working of	276	0	1
Methods of Dust Extraction	Cd. 3,223	4	10
Lead Poisoning	324	0	3
Painters' Colic: How Caused and How Best Prevented	394	0	1
Abrasive Wheels; Precautions in the Working and Installation of	264	0	1
First Aid and Ambulances	924	0	1
Doping in Aircraft Work	356	–	–
T.N.T. Manufacture: Precautionary Measures	—		—
Safety Committees in Factories and Workshops	—	0	1
Acetylene and Oxy-Acetylene Welding: Dangers Connected With	1,704	0	1
Carbon Monoxide (CO) Poisoning	932	0	2
Chemical Works: Gassing and Burns: Cautionary Notice	395	0	1
Celluloid Fire Dangers: Warning to Workers	987	0	1
Protective Clothing for Women and Girl Workers	—	0	3
Transmission Machinery: Fencing and Other Safety Precautions	—	0	6
Hoists, Protection of	—	0	4
Chains and Other Lifting Gear, Use of	—	0	6
Use of Lead in the Painting of Buildings	Cd. 7,882	1	2
Dry Powder Fire Extinguishers	Cd. 8,250	0	1
Iron Foundries: Safeguards for the Prevention of Accidents	—	0	2
Cotton Bleaching, Dyeing and Printing: Fencing of Machinery and Other Safeguards and Ventilation	—	0	2
Tin-plate Manufacture: Precautions necessary for Health and Safety	—	0	2
Iron and Steel Rolling Mills: Prevention of Accidents	1,745 and 1,746		—
Dust Explosions: Experiments with Carbonaceous Dusts	Cd. 6,662	0	1½
Manufacture of Silica Bricks: Effect of Dust Inhalation	—	0	3

The Safe Transport of Acids

By Maurice F. Crass

American methods of handling acids are the subject of an interesting article by Mr. Crass in the October issue of "Industrial and Engineering Chemistry," from which we reproduce the following extracts.

ALL lines of industry have their package and transportation problems. The difficulties involved are intensified where the products constitute a hazard to handlers and merchandise in case of breakage or rupture of the packages. The ignorance or carelessness commonly displayed in the handling of acid is in no small degree responsible for the safety rating given acid containers, which rating would be greatly improved if all who handle these packages used methods best calculated to give the maximum of safety and efficiency. Malpractice in this respect is not confined exclusively to the transportation and consuming agencies. Recent surveys have shown the necessity for a close co-operative policy between producers and users of acid.

Carboys

The well-conditioned carboy cannot be considered as a fragile container, although there are definite limits to its shock-resisting strength. A broken carboy *en route* means possible damage to merchandise, as well as danger to workmen who may not be informed as to the proper method of dealing with such leakage. The insistence, therefore, has been for a stronger, better-conditioned carboy and regulations that would eliminate the unfit.

CARBOY TESTING MACHINE

A study of the problem was undertaken by a committee of representatives from the Manufacturing Chemists' Association of the United States and the Bureau of Explosives. The preliminary survey disclosed ample cause for complaints made by the railroads, who had suffered undue losses from broken and defective carboys.

In approaching this problem, the committee gave earnest consideration to what constituted a reasonable shock in transit and, after placing this tentatively at a collision shock speed of 8 miles per hour, equalised this by means of careful tests to the shocks transmitted by the shock testing machine seen in the adjoining photograph, and thus arrived at the 55 in. component now required in the regulations. The wisdom of this action has been shown by a reduction in damage losses to railroads by more than 50 per cent. for the first year and a further large reduction the second year—a result rather astonishing when it is considered that considerable numbers of sub-standard carboys were still in service.

The old method of sealing a carboy by means of a vitrified stopper, covered over with plastic clay or plaster, burlap-wrapped and string-tied, was a practice productive of accidents and damage loss. This was remedied by developing and prescribing :

(1) A porous earthenware stopper, hard-burned and impervious to the action of acid—spillage proof and yet sufficiently porous to vent any pressure which might be otherwise built up in the bottle.

(2) A gasket made of treated (paraffin and oil) asbestos wicking—proof against the action of the acid.

(3) Metallic seals easily applied and not readily destroyed through gas or acid contact.

(4) A lip surfacing machine for repairing or surfacing away depressions in the lips of carboys chipped during course of service. The development of this machine made possible regulations forbidding use of chipped lipped carboys for transportation service.

All users of acid in carboys should observe the regulation providing for the *complete emptying* of carboys before their presentation to the carrier for return. More accidents occur through spillage than from all other causes in their handling.

Drums

This package would seem to be an ideal one for the safe transportation of sulphuric and mixed (nitrating) acids. Various conditions, however, must be taken into consideration :

(1) The metal must be of sufficient gauge to withstand severe transportation and dropping strains, with a margin of safety to care for deterioration during service.

(2) The welded seams must be free from carbonised or oxidised spots, for unless these are 100 per cent. perfect the acid will search out the defect.

(3) The inspection and testing service before filling should be efficient and carefully supervised. Inspected drums only should be filled.

(4) Drum plug should be seated on a gasket made of asbestos rope wicking.

(5) Repairs should not be made on a drum until it has been thoroughly washed out with a soda ash solution or some other neutralising agent. Even with this precaution there is possible danger from hydrogen gas ; when making repairs an open flame should be used with the utmost caution, if at all.

All users of drums should scrupulously observe the rule of storing filled drums in a cool place, not exposed to the direct rays of the sun. Full drums in stock should be stored with the plugs up and internal pressure can be avoided by loosening the plugs occasionally. Great care should be exercised in removing the drum plug. A long-handled wrench should be used and the operator's face should be turned away from the plug, for should the drum be under "built-up" pressure, acid is liable to spurt from the opening. The safe way is to give the plug a full turn and if escaping pressure is apparent, allow the pressure to escape before loosening the plug further or removing it. When discharging contents no pressure should be applied. The gravity discharge method only should be employed.

Safety Dusting in Coal Mines

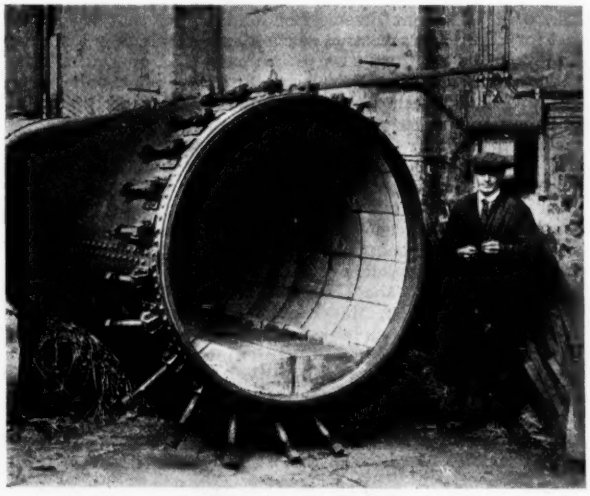
LIMESTONE and gypsum producers (the U.S.A. Bureau of Mines states in a communication just received) should welcome, as an outlet for their waste materials, the extension of the practice of dusting coal mines for the purpose of preventing coal-dust explosions. Many limestone producers are handicapped by an accumulation of fine materials that are hard to sell. Gypsum producers likewise may accumulate supplies of gypsum off colour or impure, or gypsum mixed with anhydrite, which cannot be marketed through the regular channels. For dusting material no careful selection according to rigid specifications is required, except that all the dust should pass through a 20-mesh, and that 50 per cent. should pass through a 200-mesh screen, and, therefore, waste materials could be sold at low cost. As this factor is naturally an essential requirement of rock dusting, this market might not be particularly profitable, but it would at least provide an outlet and a small return for material that must often bear the cost of handling with no return. Wide use of coal-mine dusting will depend chiefly on the availability of low-priced dusting materials. Therefore, the maintenance of low prices and the refusal of limestone operators to increase prices unreasonably as the demand grows stronger will foster the market for their waste products and will encourage a humanitarian work. Gypsum industries and some branches of the limestone industries use much coal, and cheap transportation might be assured by shipping dusting material back to the mines in empty coal trucks.

Acid-Proof Lining for Tanks

THERE are three conditions to be satisfied by any material to be used for lining tanks for vessels in which hot hydrochloric acid and similar corrosive solutions are to be contained. (1) Freedom from expansion and contraction for wide ranges of temperature. (2) Permanent resistance to corrosion of the reacting liquors. (3) The cost must be low and the material capable of being applied on the site by ordinary labour after little training.

A rubber compound which claims to satisfy these conditions has recently appeared on the market under the trade name of " Cabtyrit," being manufactured by the St. Helens Cable and Rubber Co., Ltd., of Slough. The material is the outcome of researches to design an inexpensive plant to treat refractory ores with hot boiling corrosive solutions containing free hydrochloric acid. The hydro-metallurgy of metallic ores is a young struggling industry ; it will probably in time compete with the present furnace methods of metal extraction. The many problems which these newer wet processes offer for solution presents difficulties to the chemical engineer, because the materials at his disposal are often unsuitable or very expensive.

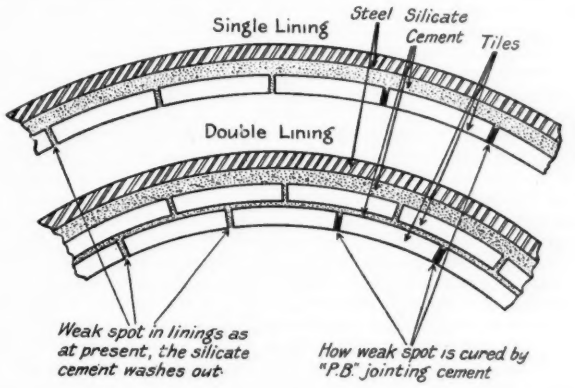
The material is a derivative of a tough rubber-sheathed electric cable which is successfully used for electric installations in acid-laden atmospheres, and is a dense heavy compound of specific gravity 1·0. It softens and becomes plastic at about 25° C., and it is claimed that it can be worked and moulded with the finger or with simple tools into any desired shape. The size and shape of the vessels do not enter into consideration in the application of the new material, the edges of the sheets being welded homogeneously. When cured the material resists the action of hydrochloric acid and its solutions at all strengths and temperatures up to 105° C., for which purpose it was originally evolved. It has also been found to withstand the action of most organic acids, such as tartaric, citric, lactic, malic and formic acids, and also of phosphoric acid and of cold sulphuric acid up to 70 per cent., and of hot vitriol at strengths not exceeding 60 per cent.



PORCELAIN LINED VAT

Attempts are now being made to fit ball and tube mills with linings of soft rubber in order to take advantage of the resistance to abrasion, attrition, and erosion which rubber exerts when refractory materials are being ground. Such mills lined with " Cabtyrit " in which hard ores are ground with strong hydrochloric acid, have been in use now for some considerable time, and after three months' running there appears to be no sign of corrosion by the acid or of erosion by the ore and flints which are used for the actual grinding.

In dyeing operations the efficient lining of vats is essential, because not only is it necessary to preserve the vat from deterioration owing to the acid liquids it contains, but the surface must be clean and non-absorbent. It must carry no history of previous shades of dyeing and in addition the material of which it is made should produce no stain when boiled in dilute acid solutions mixed with sodium sulphate and various other salts. Vats for this purpose lined with porcelain tiles, and also vats with acidstone backing and joints are made by Guthrie and Co., of Accrington. These have an iron-acidstone-porcelain combination which has qualities especially designed to meet the needs described above. Vats lined in this way are also used for treating fine ores. It is claimed that the life of these vats is indefinitely long, being in excellent condition after ten years' use with hot acid solutions, hydrochloric, sulphuric, and so forth, some of them above their boiling point and under pressure. For digester work the conditions are rather different, and for this purpose the makers use PBP jointing seal (details of



which are given in the accompanying diagram), as the temperature often ranges up to about 330° F. at 130 lb. pressure.

Vessels 21 ft. in diameter which contain sulphuric acid and other salts under high pressures and revolve on 3-ft. diameter shafts have been lined in this way, a large vat being shown in the adjoining photograph. An increasingly wide application of lining systems is being found, as, for instance, in the manufacture of pure guncotton, grit proof pulp for paper, and finely tinted woollen fabrics. Fittings and apparatus such as sieves, division boards, winces, tops, sliding doors, rollers, and agitators would, of course, be too heavy in porcelain-covered material, and in these cases acidstone may be used. It is claimed that acidstone has a high tensile strength, considering its lightness, of about 3,600 lb. to 4,000 lb. per square inch, and articles in this material weighing as much as a ton in one piece have been manufactured.

Metal Protecting Paint

THE engineers of chemical works have probably more reason to use great care in the selection of a protective paint than in any other trade, because chemical works are constantly exposed to fumes from gases, acids, alkalis, etc., that tend to break down the paint film and allow corrosion to take place.

One consideration in the selection of a pigment is its colour, as paints are used to a much greater extent for decorative than for purely protective purposes, but where the preservation of metallic surfaces is the object sought, then the prime consideration should be given to the effect of the pigment so far as it aids in preserving the original elasticity of the dry oil, or in other words, " the life of the oil." The first requisite is that the pigment shall be inert—that is, it shall not undergo any chemical change in use, because such change must result in a change of volume. The effect of such change of volume is easily understood, since each particle of pigment is surrounded by an envelope of hardened oil. If the pigment particle increases in size, this envelope must eventually be ruptured ; if it decreases in size, a void occurs between the pigment and the oil. In either case the film has become previous, and so has lost much of its protective power.

The essential factor in the Silica-Graphite paint, manufactured by C. R. Averill, of 22, Duke Street, Stamford Street, London, S.E.1, under sole license from the Joseph Dixon Crucible Co., which has been used for over 55 years in the

protection of metallic surfaces, is the unique construction of the pigment. While graphite alone is absolutely inert, it requires something tougher to strengthen it to help resist the wear which takes place under the influence of the elements, the action of acids and abrasive action of dust and cinders, etc. In this case, silica is brought in. It is not mechanically added, but is mined together with the natural graphite and ground to an impalpable degree of fineness. When this pigment is mixed with the vehicle it forms a covering of great flexibility, elasticity, and durability.

Rust-Proof Coating

It has been estimated that the loss by rusting of unprotected iron and steel structures amounts to several million pounds every year within the British Empire alone, and also that the cost of removing rust is thirty times that of preventing it, hence the damage caused by corrosion is a factor of considerable importance.

Corrosion of iron and steel is caused by electrolytic action in the presence of water, and while it is essential to keep moisture from the iron, electrolytic action should also be prevented by using a covering which is at the same time an insulator.

A material made to satisfy these conditions is "Durastic," manufactured by the Durastic Bituminous Paint Co., Ltd., of 1, Central Buildings, Westminster, S.W.1. This product is a bituminous anti-corrosive solution which is claimed to be especially suited for protecting iron surfaces, as the bitumen compound embodied in it has the same coefficient of elasticity as the iron which it covers and so sinks into the metal, resulting in an air-excluding covering. Durastic is not affected by extreme heat or cold and is free from bodies capable of attacking iron or liable to be decomposed by atmospheric influences. The material will stand a weak solution of sulphuric and hydrochloric acids, and is suitable for protecting iron roofings against deposits from chimneys and slack, which cause pelting when allowed to lie on uncoated iron work.

Roof Preservation

A protective material which has special applications in the preserving and waterproofing of roofs of every description, including metal, such as corrugated iron, is "Everseal," a liquid and plastic cement made by Everseal Products, Ltd., Newton Works, Goldsmith Street, London, W.C.2. Numerous prominent chemical concerns are users of this material which, it is claimed, will save about 75 per cent. of the cost of replacing inefficient roofs. It requires no melting, heating, or mixing and is therefore simple in application. The substance expands and contracts with the surface on which it is spread, while the asbestos fibre content acts as a binder, and the gilsonite asphalt and waterproofing oils give it elastic rubber-like qualities.

Dust and Fume Collecting Plant

THE necessity of introducing dust collecting plants into certain branches of the chemical industry first became apparent when legislation was introduced to protect workmen against accidents. Recurring disasters in a wide range of industries have demanded recognition of the fact that most dusts are dangerous explosives, and it is also realised that a dusty atmosphere in the factory not only impairs the health of those working among the plant, but also creates inefficiency among both the human and mechanical elements of the factory. Besides eliminating these hazards, the removal of dust—which in itself often represents a more or less valuable material—from grinding and separating processes gives a clean finished product, thus having the further advantage of improving the quality of output.

The early methods of dust collection by means of the old open dust room and cyclone were first improved upon by installing a number of filter-cloth bags into which the dust-laden air was passed, and the dust removed from the cloth by hand. Continual experiment in the design of such machines has now resulted in automatic plant, such as the patent Filter Dust Collector manufactured by A. and B. Harris, of 19, Russell Square, London, W.C.1.

The working principle of the machine is that a suction is produced in the filter-casing by means of a fan connected to the filter, which draws the dust-laden air into tubes, from which it is discharged into the open in a purified state, while the dust is retained inside the tubes. The cleansing of the tubes is then effected in the following manner: a baffle in the suction box above each compartment is reversed by the mechanism, thereby cutting off the dust-laden air from the compartment and opening a passage giving free access to the atmospheric air, which is drawn into the compartment. This reversed current passes through the tubes from the outside, and out of their lower ends into a neighbouring compartment. At the same time the tubes are subjected to a repeated mechanical shaking which, together with the reversed current, removes the dust from the walls of the tubes and allows it to fall into the hopper below, from which it is discharged automatically. The discharged dust passes through an air-lock out of the machine, either to be fed directly into sacks or to be otherwise dealt with as desired. The power required for driving this filter collector is less than 1 h.p., and it is claimed that when exhausting dust which contains no poisonous fumes it is possible to cleanse the air so perfectly that it can be returned again into the workshops, thereby having the important advantage in winter of saving the heat of the air.

Fire Extinguishers

THE methods used to extinguish fires which may break out in chemical works will vary according to particular circumstances, but the application of water for this purpose has now largely been supplanted by the appearance on the market of various forms of chemical extinguishers. Most of these depend for their action on carbonic acid, either in the liquid or gaseous form, and this is produced when required by the mixing of chemicals which form this compound, by shaking or inverting the container to bring about this result. The portable types of extinguisher sold under the names "Minimax" and "Pyrene" act in this way, while another make which has just appeared on the market is the "Total" dry extinguisher. Some such machines are unsuitable for certain types of fire, and in such cases it is usual to place warning notices nearby, stating that they must not be used, for instance, on burning liquids, in confined quarters, under high tension conditions, and so on. It is claimed for this new dry extinguisher, manufactured by the Total Fire Extinguisher Co., Ltd., of 1-3, Regent Street, London, S.W.1, that it can be used for all fires irrespective of their origin, which is a special advantage, as it is not always the case that operators, who are in a state of excitement when a fire breaks out, will immediately decide whether the fire appliance is suitable to deal with the particular conflagration. The principle of the Total machine is to cover the fire with a dry cloud of extinguishing powder mixed with carbon dioxide, and it is claimed that it can be effectively used for burning solids and liquids alike.

For use in cases of burning liquids, however, the foam type of extinguisher has recently been coming into more extended use, a light foam being formed by the mixture of liquids which acts as a blanket, preventing the spread of flames by excluding the air. The Foamite system, made by Foamite Firefoam, Ltd., of 24, Maddox Street, London, W.1, works on this principle and has been supplied to many oil companies, and another extinguishing foam of the same kind is "Firesnow," supplied by John Morris, Ltd., of Mulberry Street, Brazennose Street, Manchester. Foam can also be used for extinguishing fires of solids, and has the advantage over liquids that it can be brushed off afterwards and so does not damage the materials to which it has been applied.

Application of Foam

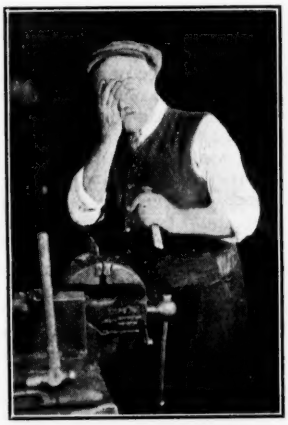
Firefoam is produced by the commingling of two special acid and carbonate alkali solutions, the alkali containing a foaming ingredient, or, as it may preferably be termed, "stabiliser." Foam has the properties of floating on an oil surface and adhering to solid surfaces irrespective of their position. Fires may thus be effectively blanketed with an inert gas in foam form, a gas which cannot readily be dissipated by wind, draught, or other mechanical factors. A useful type of foam installation is the hydrant system of protection of refineries, tar by-product plants, alcohol factories, and all works concerned with processes involving the treatment of highly inflammable liquids and solids. Accidents to stills, etc., often result in the release of streams of burning liquid which may be dealt with effectively by powerful foam jets.

Accident Prevention for the Employer

Practical Methods Outlined

ACCIDENT prevention for the employer may present a serious difficulty in that while he may hold with the aims of safety first measures, he may be ignorant of the necessary steps to effect their introduction.

To such an employer there is much to commend the policy of the Accident Prevention Department, National Employers' Mutual General Insurance Association, Ltd., which offers a service of systematised accident prevention for a very small annual fee. The association has also produced a safety-first film which, while forming an interesting story, includes numerous typical works accidents, and impresses the moral of safety first. This film has been shown at numerous works all over the country, including many chemical undertakings. The illustration herewith is taken from the film and demonstrates the human element in accident risks—the man has removed his protective goggles only to receive injury to his eyes from flying splinters.



It has been found from statistics that of industrial accidents, 10 per cent. are caused by lack of guards, etc., and the remainder by such varying causes as recklessness, lack of knowledge or supervision, indifference, or horseplay. The plan is to instil accident prevention by active measures, starting from the top. The employer must show his practical interest in accident prevention, the foreman must be tackled separately on the subject, and the employees generally must be spoken to, and the subject of safety first placed upon an equal basis with other features of the works administration.

A series of appropriate posters has been designed and published by the Association, and these are supplied for posting in prominent positions in the works. It has been found that safety first posters, to attract attention, must be changed each week, and this is provided for.

Chemical Flame-Proofing Tests

A PAMPHLET—"Red Book," No. 245—just issued by the National Fire Brigades' Association contains the committee's report on a test made with textiles, packing materials, etc., before and after treatment with "Neocellon" flame-proofing solution. The test was held at the Willesden Urban District Council's Fire Station, Kilburn, and its objects were, first, to obtain reliable data as to the relative combustibility of such materials and, secondly, to ascertain how far the relative fire resistance of the textiles and materials could be improved by the ready application of chemicals. The test was conducted to the satisfaction of the committee.

It is stated that textiles and woodwork can be proofed either by brushing, dipping or spraying, while paper may be damped and the flame-proofing solid dusted on, or it may be run through a bath of the solution.

The solution can be used in several ways for flame-proofing purposes in chemical works. Cloth treated with Neocellon and wrapped round cases of chemicals protects them from flame, and is claimed to be especially useful in this way for celluloid film containers, where considerable care has to be exercised owing to the inflammable nature of the material. Shavings, straw and sawdust can be flame-proofed and kept ready for use as fire extinguishers, as these not only stifle the fire but create dense fumes which prevent the flames spreading to other quarters. The solution can also be employed in the manufacture of explosives for rendering cartridge paper non-inflammable. Much damage has been caused by preignition in the process of wrapping cartridges and explosives. It is interesting to record that the makers, Neocellon, Ltd., of Garratt Lane, Wandsworth, London, state that their preparation complies to the standard of non-inflammability prescribed by the regulations of the Secretary of State.

The Passing of Wembley

Last Days at the British Empire Exhibition

THE British Empire Exhibition, which closes to-day (Saturday) seemed already in the early stage of dissolution when it was visited this week by a representative of THE CHEMICAL AGE. The attendance was much above the recent average, but stalls in the arcade approaches were being dismantled or boarded up and outside stands here and there were slackened in their efforts and displays. Inside the palaces of Industry and Engineering there was little difference to record. Some exhibitors who had attempted to decamp earlier in the week were, it is understood, recalled by the authorities, who no doubt desired to prevent any precedent for a general exodus.

The crowd was not of the business type, and as one exhibitor in the chemistry section put it, "Whereas last year you could sell at almost any price just because it was Wembley, the crowd now is only out for bargains and reduced prices." Auctions were in progress at many of the Colonial pavilions. Consequently the selling stands were well patronised, but the exhibit stands were deserted. It is impossible to give a definite opinion upon results. One large standholder in the chemistry section expressed complete satisfaction not only from the publicity point of view but from actual sales and contracts. Others considered that their returns had justified the outlay, while some were frankly disappointed. On the pharmaceutical side many of the exhibitors expressed considerable satisfaction at the season's sales.

The arrangements for the close to-day are that the Duke of York, as president, will attend the closing ceremony at 3 p.m., and the last performance of the Tattoo will be given in the evening. The closing time will be extended to 11.30 p.m.

Low-Temperature Carbonisation Exhibit

A DEMONSTRATION of considerable interest was given last week at Wembley, when the low-temperature carbonization plant erected by Mineral Oils Extraction, Ltd., of Finsbury Pavement, E.C.2, was in continuous operation, treating a bulk parcel of Scottish cannel coal. It will be remembered that last year this plant was working on Burmese oil-shale, for which purpose it was originally devised; but its use for the extraction of oils from cannel coal is an application of more immediate interest. Notwithstanding the intense research which has been conducted on the low-temperature carbonisation process, it has largely been directed to the treatment of coals of a coking character, which yield only a comparatively small quantity of oil, usually not exceeding thirty gallons per ton. With non-coking materials, however, the problem is a different one, as cannel coals yield a higher percentage of oil, and in the case of some Derbyshire products, as much as 115 gallons of oil per ton has been obtained.

The plant on view in the Burma Section of the British Empire Exhibition is constructed under the retort and condenser patents of Mr. R. H. Crozier. The equal heating of the charge at the centre of the retort is assured by a system of flues. Steam is admitted at the bottom of the retort, takes up the heat from the spent cannel coal residue, becomes superheated, and redistributes this heat throughout the shale mass higher up in the retort. It is found by use of this retort that sixty gallons of oil can be obtained from a ton of Scottish cannel coal, which is, of course, mined in conjunction with steam coal. The value of the crude tar was stated to be 3d. per gallon, while a ton of cannel coal treated in this way gave a smokeless fuel residue valued at £1 and ammonia and gas products worth 10s. Previously, after the removal of steam coal, Scottish cannel has largely been a waste product, but, as was proved by this interesting demonstration, it can now be resolved into valuable products.

Lectures on Dye-Making

Sir Max Muspratt's Survey of Progress

THE Worshipful Company of Dyers has arranged a series of lectures to interest those connected with the dye-making industry and to emphasise the national importance of a self-supporting dye-making industry. The first of these lectures was held at the Dyers' Hall, Dowgate Hill, London, E.C., on Thursday, October 22, when Sir Max Muspratt (chairman of the United Alkali Co.) spoke on "How Dyes are Made."

Mr. W. W. LEUCHARS (Prime Warden of the company), who presided, said that this series of lectures was a new venture which would give the public an opportunity of learning all about dyes from some of the best speakers on the different branches of the industry. He was gratified that many of those present had taken tickets for the whole series.

Sir MAX MUSPRATT referred briefly to the antiquity of the dyeing industry, and how dyes had been used by ancient civilisations. Until comparatively recently, however, the dyes used were of natural origin. The great revolution which took place about the middle of last century in the manufacture of dyes was a chemical revolution. Sir Max likened the chemist who invented or made a dye to an architect, but pointed out that, whereas the architect worked with concrete materials, the chemist worked with things so infinitesimal as to be totally invisible, and from those materials he built and interchanged and altered until he produced a dyestuff.

Sir Max then went on to deal with the raw materials for dye-making, taking first the inorganic bodies. Dealing with nitric acid, he emphasised the importance of the fact that, whereas a few years ago the chemist had to obtain his raw material for nitric acid from South America—and this raw material was all-important in times of war—he could now obtain it from the atmosphere. Sulphuric acid was next mentioned, and its production from pyrites. Each one of these raw materials represented a gigantic industry. Something like 1¼ million tons of sulphuric acid were made in this country annually, and there were about 120 works manufacturing it. Other raw materials discussed were salt, caustic soda, and sulphide of soda. All those inorganic raw materials represented big industries in themselves, because there were countless other uses for them apart from dye-making.

Sir Max then referred to the three organic bodies obtained from coal tar which were the basis of the dye industry, namely, the benzol, naphthalene, and anthracene series, which were used not only for making dyes, but for making drugs and fine chemicals of every description. In view of the large number of dyes made, Sir Max confined his attention to the sulphur dyes, tracing the various reactions involved and explaining them by means of diagrams.

National Necessity

It ought to be understood by everyone, Sir Max said, that a great deal of time, money, and brains were required in building up these industries. Each colour of the many thousands produced required the individual study, at every single step, of an expert chemist, first in the research laboratory and afterwards in following up the various processes. What was also of great importance to the national welfare was that we should have these chemists trained, not only because of the dyes that they produced, but because, in times of war, they were the only men to whom we could go to produce supplies of explosives and other armaments. Although he hoped these explosives would not be required again in war, in the nation's interests we dare not be without them. He mentioned particularly di-nitro-chlor-benzol. This, by two steps, was converted into picric acid, at a time when this country was extremely short of picric acid for making explosives, and in the course of a few months an output of something like 90 tons per week was reached because a few people had had the foresight, on quite a small scale, to manufacture picric acid before the war.

The country wanted a great body of men and women who knew thoroughly and entirely every phase of organic chemistry, and who were capable of turning every new discovery and development to the better progress of mankind and to the advance of civilisation. Sir Max appealed to the general public to insist upon this great industry of dye manufacturing being maintained in this country.

Professor G. T. MORGAN (Superintendent of the Industrial Chemical Laboratory at Teddington), who proposed a vote of thanks to Sir Max, said it was only by having a large number of workers who were willing to devote their lives even to one series of dyes that the Germans had been able to achieve what, until a few years ago, was really a monopoly. He was, as a member of the Dyestuffs Licensing Committee, in favour of the present system of protection, and he did not believe that the protection had really resulted in an increase in the price of dyes. About three years ago, he said, dye users in this country were paying 25s. per lb. for a certain German colour imported under a licence granted by the Licensing Committee; the British Dyestuffs Corporation were implored to take up the manufacture of this colour. In Huddersfield they had set up a plant which was said to have cost £80,000 and, after a year's research, they produced the colour at 12s. 6d. per lb., or at 8s. 4d. per lb. for bulk orders. The only reward of the British Dyestuffs Corporation was a request that they should sell it at 6s. per lb. At that time they could not do that, and consequently that very expensive plant was shut down, some of the workpeople dismissed, and the chemists transferred to other work. He believed that it was now being made in this country at 3s. or 4s. per lb. There was a comparatively large number of dye-makers in this country who did compete with one another and were prepared to cut prices, so that there again the Dyestuffs Act was, on the whole, for the benefit of the community. No nation could be independent and self-contained in regard to matters of war unless it had a flourishing peace industry in these coal tar products. There were, however, very many possible uses to which the substances could be put in times of peace, such, for instance, as in the manufacture of synthetic resins.

The CHAIRMAN, seconding the vote of thanks, said that it seemed to him that in the field of dye-making the possibilities for energetic young men were limitless, and he hoped that the lectures would increase the enthusiasm of those attending the lectures to carry on and to see that the dye-making industry flourished.

Sir MAX MUSPRATT, responding, said that one of his chemical problems was the manufacture of benzol, naphthalene, anthracene, and other products synthetically.

Strike at London Chemical Works

WE have received from Mr. Arthur J. Gillian, General Secretary of the National Drug and Chemical Union, concerning the strike at the works of Blackie and Co., manufacturing chemists, Tower Bridge Road, London, S.E., a statement in which he says that about a month ago the staff, mainly female, decided to become members of the National Drug and Chemical Union. The management stated that no Union employees would be required after October 17. As a result of a conference with the Union this notice was withdrawn. Then, the Union states, certain restrictions were imposed and three members were discharged. On Monday, October 26, on 'phoning the firm for the purpose of having a talk with them, Mr. Gillian was informed that they had nothing to say to him. The Union then withdrew all their members and declared a stoppage until the people who had been discharged had been reinstated, and the Union's standard conditions agreed to and operated.

The statement goes on to say that almost every house of importance in the trade at the present moment is organised in this Union, together with a very large membership in the retail shops, and a notice has been issued instructing all their members not to handle this firm's goods until further notice.

At the time of the stoppage on Monday, Mr. Gillian says, the following is the specimen of some of the weekly wages paid :

		s. d.			s. d.
Woman	23 years	19 0	Union Rate		28 6
,,	21 ,, ...	20 0	,, ,, ...		28 6
Man	24 ,, ...	42 6	,, ,, ...		63 0
,,	22 ,, ...	36 0	,, ,, ...		63 0
Woman	41 ,, ...	24 0	,, ,, ...		28 6
,,	23 ,, ...	23 0	,, ,, ...		28 6
,,	24 ,, ...	19 0	,, ,, ...		28 6

On inquiry at the works the CHEMICAL AGE learns that business is being carried on as usual.

Ten Years of Chemical Progress

Epitomised at U.S.A. Chemical Exposition

(From Our Special Correspondent.)

New York, October 22.

Ten years of American chemical progress were epitomised at the tenth Exposition of Chemical Industries which closed at the Grand Central Palace, New York, on October 3, after one of the most successful expositions ever held in the United States. Exact attendance records show that 67,836 persons visited the exposition, and that of this number 12,464 registered as representing some branch of a chemical, chemical process, or chemical consuming industry.

The exposition was the nucleus of a gala " Chemical Week " in New York. About fifteen societies and associations of the chemical, chemical engineering and allied fields held individual meetings or participated in group meetings. Headed by a four days' session of all sections of the American Chemical Society east of the Mississippi River, the society gatherings attracted the largest body of chemical executives and chemists ever assembled in a single city at the same time. A chemical industries banquet, at which Senator James W. Wadsworth was the chief speaker, was attended by over six hundred persons. Visitors from almost every country of the globe were registered during the week of the exposition—China, India, South America, Canada, and all the countries of Europe being represented.

The exposition had rather less than four hundred exhibits from industrial organisations. Exhibits ranging from the finest precision instruments up to large scale filter-presses, evaporators and chemical kettles, were displayed. New developments in plant and laboratory equipment, new chemical products, new dyestuffs, new processes in the chemical and other industries only emphasised the progress of American chemistry during the past few years. More new products were displayed this year than at any previous exposition, going back to the original exhibits in 1915.

Special Features

One of the innovations at this year's exposition was a Court of Chemical Achievement, in which were entered in the form of small exhibits many of the new developments in chemical products and chemical processes in the United States which have come to the front during the past few years. Altogether 307 new products were shown by 22 organisations. At the various exhibits, representatives of the company or group owning or controlling the product or process were present to explain its history and uses to visitors, and a brochure of 88 pages was published briefly describing the achievements.

Among the outstanding developments which received more than ordinary attention was a splendid exhibit of chemical fibres of the artificial silk type and which occupied a section labelled " Chemistry's Contribution to the Textile Industry." The entire manufacture of the fibres or filaments from raw material to finished garment was completely covered by the exhibit. Even the machinery with which the various steps were accomplished was shown. Another feature was the more recent development of the new lacquers for general industrial use. These two types of products, along with a number of new pieces of equipment, many of them based on new ideas in chemical engineering, were centres of interest throughout the exposition.

The chemical work of the United States Government was well displayed. Chemistry as part of modern warfare received considerable attention during the week. The United States Army Chemical Warfare Service showed new products in the Court of Chemical Achievement, and the Government was also represented in a large series of exhibits by the Department of Agriculture and the Department of Commerce. The closeness with which these Government departments are working with American industry, especially the chemical process industries, was emphasised. The exhibits showed conclusively that the development of industry generally is very closely allied to progress in chemistry and the development of the chemical industry. Excellent exhibits were sent by large organisations designed distinctly for educational purposes, and these constituted some of the best sales displays on view.

The management of the exposition this year was in the hands of those who originated the 1915 exposition at the same place. Messrs. Charles F. Roth and Fred W. Payne were the co-managers. Associated with them was an advisory committee made up of prominent chemists and executives of the chemical industry, headed by Dr. Arthur D. Little, of Boston. Though a member of the committee since its inception, this was Dr. Little's first year as chairman of the Advisory committee, Dr. Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers' Association, having served since 1915 and relinquished the chairmanship this year owing to the pressure of other duties.

Next Exposition in 1927

So well pleased were the exhibitors with the exposition and its results that at a meeting of a large body a unanimous resolution was passed " that the exposition management be commended and thanked for the conduct of the best exposition that has been held in the past ten years. The next exposition will be held at the Grand Central Palace, New York, two years hence, during the week of September 26 to October 1, 1927. Although the eleventh exposition is two years off, the majority of the leading exhibitors have already contracted for their spaces for 1927.

Inflammability of Ether Vapour

To the Editor of The Chemical Age.

Sir,—I have just read in The Chemical Age for October 17 the account of a remarkable explosion during an operation for a fractured jaw, in which the anæsthetic used was a mixture of oxygen and ether, with which I presume the patient's lungs were charged. To keep his teeth dry a dental syringe was used to apply warm air. Here were all the elements required to produce a violent explosion—if a light came in contact with the ether mixture. It is stated that there was no naked light within 6 ft. of the patient.

I submit that to have a naked light even 10 ft. away was to incur the risk of trouble, when one considers how highly inflammable ether vapour is in air, and the mixture with oxygen would be more sensitive to flame and more violently explosive than a mixture of ether and air.

On one occasion I was performing an experiment with ether in a small basin on an ordinary students' laboratory bench in school (as a teacher). I told the student to put out his Bunsen flame, but did not notice another light about 10 or 12 ft. away. After a short time the ether vapour travelled along the bench and was ignited by the lighted Bunsen. We saw the flame travel back along the bench from burner to basin where the remaining ether at once took fire.

I do not, of course, know the arrangements in the room where the operation was performed, but it seems to me that a very necessary precaution under similar conditions is to exclude any light which could ignite a mixture of ether vapour, and air or oxygen. It appears obvious that the vapours in the patient's lungs exploded, with, of course, disastrous results.—I am, etc.,

A. Taylor.

Stockport, October 24.

Important New British Dye

An important method of dyeing has been discovered by Mr. W. F. A. Ermen, manager of the dyeworks of Robert Cawley and Co., of Crumpsall and Manchester. The discovery is an improved anilin black for use in cotton goods which is claimed to be free from the peculiar defects of all the blacks used hitherto. All that have been produced up to now are unsatisfactory in one way or another. The difference between Mr. Ermen's new dye and the old anilin black is merely a difference in the composition of the liquor, and no new machinery is needed for its application. The colour of the new dye is right, so that it does not need to be " topped " with any other colour, and it is also claimed that it is permanent. So far from weakening the material, like the ordinary anilin black, it adds materially to its strength. The process of " schreinering " usually weakens a fabric dyed by the ordinary processes. Fabrics treated with the new anilin black remain virtually as strong after " schreinering " as they were before.

From Week to Week

DR. W. CULLEN has been elected chairman of the Climax Rock Drill and Engineering Works, Ltd.

FIRE CAUSED SLIGHT DAMAGE at the paint and varnish works of Docker Brothers, Birmingham, on Tuesday.

DR. J. H. BURN has been appointed director of the new laboratory to be established by the Pharmaceutical Society of Great Britain.

EDINBURGH UNIVERSITY has awarded the following degrees:—Doctor of Science (department of engineering) to Joseph Parker, B.Sc.; Doctor of Philosophy (faculty of science) to George Brunton Wallace, B.Sc.

A PETITION HAS BEEN MADE to Grays (Essex) Council protesting against an alleged nuisance from fumes emanating from the Grays Dyes and Colour Works. The Council are considering the question of applying for an injunction.

THE MOND NICKEL CO., LTD., announce that the address of their refinery and research laboratory has been changed from 41A, Great Suffolk Street, Southwark, S.E.1, to Bashley Road, London, N.W.10. The new telephone number is "Willesden 4486."

AT THE SALE in London on Thursday, October 22, of the Harris and Lewis estates in the Hebrides, which were bought by the late Lord Leverhulme, Dr. G. G. Henderson, Regius Professor of Chemistry at Glasgow University, purchased Horsaclett Lodge and fishings. Thirteen lots offered realised £31,550.

THE SALE OF THE MAANSBO SUPERPHOSPHATE WORKS at Dalarne by the Stockholm Superphosphate Co. is reported to have been completed subject to negotiations as to detail. The buyers are the Swedish Match Co., whose chlorate factory at Alby is at present inadequate, in view of increased match production. It is understood that the price runs into millions.

IT WAS DECIDED at the monthly meeting of the executive committee of the Mansion House Association on Railway and Canal Traffic on Friday, October 23, that a deputation should be appointed to wait upon the Joint Claims Committee of the Railway Clearing House on the question of the claims of railway companies on traffic carted by senders, consignees, or their agents.

THE BRITISH RESEARCH ASSOCIATION for the Woollen and Worsted Industries announces the following awards for 1925-26: Research fellowships to Mr. J. E. Nichols, for researches at the Animal Breeding Research Department of Edinburgh University on the fibres of various breeds of sheep, and to Miss J. S. S. Blyth, to conduct research at the same department on the microscopical examination of the fleeces of British breeds of sheep. Advanced scholarships have been awarded to Mr. H. S. Bell, tenable at University College, Nottingham; and to Mr. W. Riddle, tenable at the Scottish Woollen Technical College, Galashiels.

IN THE ANNUAL REPORT of Glasgow Technical College, a revival in the demand for trained chemists and metallurgists is recorded. The Beilby medal in technical chemistry has been awarded for the first time to Mr. J. R. Campbell, and there is a sufficient balance to endow an annual prize to accompany the medal. The direct connection between the College and the chemists of the Shale Oil Research Association will be severed shortly by the transference of the latter to the new central laboratories at Middleton Hall; but contact will still be preserved if effect is given to the present proposal to retain the services of Professor Gray in a consultative capacity.

FURTHER SUBSCRIBERS TO THE LEEDS UNIVERSITY appeal for £500,000 include J. Watson and Sons, soap manufacturers, Leeds, £1,000; Charles F. Stead and Co., tanners, Leeds, £750; Adolph Hess and Brothers, oil manufacturers, Leeds, £300; J. Crockatt, Ltd., dyers, Leeds, and Reynolds and Branson, Ltd., wholesale druggists, Leeds, each £250; J. Nicholson and Sons, chemical manufacturers, Leeds, £140; Naylor, Jennings and Co., dyers, Leeds, £105; Professor and Mrs. J. W. Cobb, Emeritus Professor and Mrs. J. B. Cohen, Professor and Mrs. N. M. Comber, Colne Vale Dye and Chemical Works, Milnsbridge, Professor H. M. Dawson, G. and T. Earle, Ltd., cement manufacturers, Hull; Professor and Mrs. D. McCandlish, and Professor A. G. Perkin, each £100. A later list gives Courtaulds, Ltd., £1,000,

IN THE LONDON BANKRUPTCY COURT on Wednesday, October 21, John Duval Bishop and Stanley William Thorp (lately trading as J. D. Bishop and Co.), late of 22 and 23, Great Tower Street, London, who were adjudged bankrupt on April 27, sought an order of discharge. A chemical and drug merchants' business had been carried on since 1916 by Bishop at 87, Borough High Street, in 1918 Thorp went into partnership, and in 1919 they transferred their business to a company called J. D. Bishop and Co., Ltd., of which they acted as directors. In 1921 they transferred to Great Tower Street, and in 1923 went into liquidation. The total joint unsecured liabilities, including deferred, were expected to be £3,906, and the joint assets had realised £1,214, with an additional £11 anticipated. The failure was attributed to bad debts, to bad trade, and to heavy overhead charges. The discharge was suspended for two years.

DR. HERBERT LEVENSTEIN has been elected President of the Manchester Literary and Philosophical Society.

AN EXPLOSION in the filling sheds of W. and J. Wilder, firework manufacturers, Greet, on Monday, resulted in injuries to two employees.

THE FIRST MEETING of the Hull Chemical and Engineering Society was held last week, when Mr. H. A. Scruton, F.I.C., gave his presidential address on "The Outlook and Mentality of the Chemist."

LORD GAINFORD, speaking at private function of the British Road Tar Association in London on Wednesday, said that as only 4 per cent. of our roads touched fishing streams, the objections to tar on grounds of poisonous effects seemed to be exaggerated.

A REMARKABLE CASE of a ship's mate who was fatally gassed by fumes arising from a cargo of apples was inquired into at an inquest at Teignmouth on Monday. An official inquiry will probably be instituted, and the inquest was adjourned for a month.

ON NOVEMBER 5 an extraordinary meeting of the Bayer (Leverkusen) Dye Works and of the Griesheim Electron, Frankfurt, is to be held, to arrange for the establishment of the Bayer headquarters at Frankfurt in accordance with the recent fusion agreements.

THE CHAIR OF CELLULOSE CHEMISTRY at McGill University, Montreal, has been accepted by Dr. Harold Hibbert, of Yalea University. The chair has been founded following a bequest of $200,000 by the late Mrs. E. B. Eddy, of Ottawa, to the Chemical Department of McGill University.

THE FIRST MEETING of the session of the Society of Chemical Industry, London Section, will be held in the rooms of the Chemical Society, Burlington House, Piccadilly, W.1, on Monday, November 2, at 8 p.m., when the chairman of the section, Mr. C. S. Garland, will speak on "Taking Stock."

THE EMINENT CHEMIST referred to in last week's paragraph concerning the new Lancashire artificial silk manufacturing company, British Visada, Ltd., is Mr. S. S. Napper, F.I.C., A.C.G.I., who has been chief works and research chemist with Courtaulds, Ltd., for nearly twenty years. He will act as director and consulting chemist to the new concern. Applications for the post of chief chemist are at present under consideration. The company will manufacture on the viscose process and the first unit should be working by May, 1926. The issue of shares on Monday was heavily over-subscribed.

THE BRITISH DYESTUFFS CORPORATION announce the addition to their range of "Cellutyl" colours of Duranol Black paste, which, as the samples show, gives a full jet black when dyed direct on Celanese knitted fabric and Celanese yarn. Duranol Black, it is stated, behaves in the same way as the other members of the "Cellutyl" series as regards ease of dyeing and high fastness properties.

REPORTS ARE CURRENT that the Board of Trade has been considering the desirability of withdrawing from the British Dyestuffs Corporation, and that a report on the subject will be presented to the Cabinet, generally recommending such a course, at an early date. The Government holds nearly one and three-quarter million in preference ordinary and ordinary shares, and although future arrangements concerning these holdings have apparently not yet been formulated, it will be recalled that some months ago the rumour was current that a section of the Stock Exchange would be made for their disposal.

MR. W. J. U. WOOLCOCK addressed a joint meeting of the Bristol Section of the Society of Chemical Industry and the Institute of Chemistry at Bristol on Wednesday, October 22, on "The British Chemical Industry." Sir Ernest Cook presided. Mr. Woolcock referred to the growth of the dyestuffs industry, and said that we now met about 85 to 90 per cent. of our dyestuffs needs. One difficulty with dyestuffs was that they could not increase the demand. As to the effect of the Safeguarding Act, List H included about 5,000 fine chemicals, and while in 1922 we were making only 1,500, we were now making 2,365, and there were indications that that number would be increased.

Obituary

DR. M. LANDAU, founder of the first ammonia soda factory in Bosnia, aged 63 years.

MR. FRANCIS JONES, M.Sc., aged 80, late chemistry master at Manchester Grammar School, on Thursday, October 22. He studied under Professor Bunsen at Heidelburg, and had done much research work.

MR. ANDREW ARTHUR ROSE, at Edinburgh, on Thursday, October 22, aged 78. On leaving school he joined the firm of Craig and Rose, paint and varnish manufacturers, of which his father was one of the founders, and he continued in its service to become one of the best known merchants in the city. He retired about ten years ago. He was a director of several public companies including the North British Rubber Co.

MR. DAVID ROSS TODD, who during the war was resident engineer at the Government high explosives factory at Langwith, at Deganwy on Monday. For some time he had suffered in health as the result of being gassed when rescuing two girls who were overcome by fumes at the factory.

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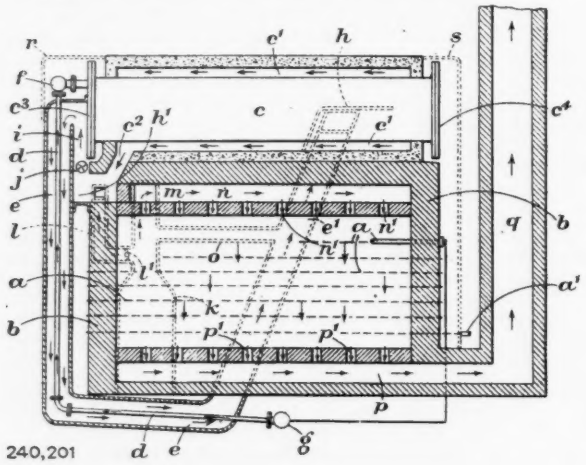
Abstracts of Complete Specifications

240,201.—Cracking Mineral Oils, Apparatus for. T. A. Smith, R. Pitkethly, and E. S. L. Beale, Meadhurst, Cadbury Road, Sunbury-on-Thames. Application date, May 22, 1924.

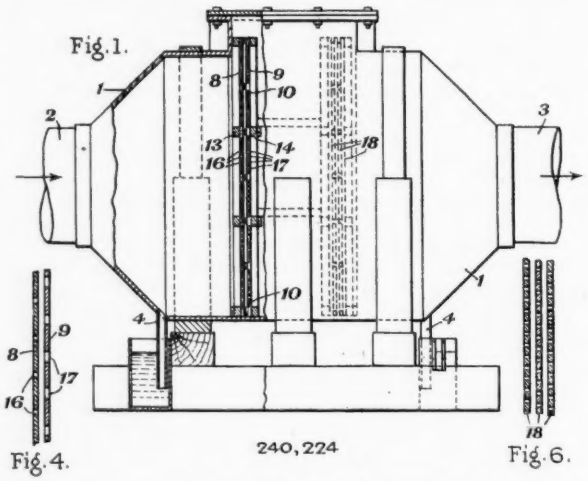
This apparatus is for avoiding local overheating in stills for cracking mineral oils. The furnace gases are divided into two parts, one part passing into a circuit of flues and displacing a corresponding amount of circulating gases, while the other part is cooled by dilution with the displaced gases, and passed through other parts of the apparatus. A preheater *a* is mounted in a setting *b*, and the cracking tubes *d* which are of relatively small diameter are arranged in the flue *e*, while their upper ends are connected to a header *f* communicating with a chamber *c* in which the treated oil remains for a predetermined time to permit its conversion into lighter products. The oil is supplied from the preheater



a to the tubes *d* through a header *g*. The flue *e* is extended upwards at e^1 into the annular space c^1 surrounding the chamber *c*. The upper end of the flue *e* communicates with the chamber h^1, which also receives circulating gases from the space c^1 through a passage c^2. The hot gases from the furnace *k* are admitted through a flue *l* laterally into the chamber h^1. A damper l^1 in the flue *l* is thermostatically cooled. The main outlet flue *m* of the furnace communicates with the flue *n* immediately above the preheater, and also through a flue *o* with the flue e^1. The flue *o* allows the cooler gases displaced by the admission of hot gases into the circuit to pass into the main outlet *m*. The hot gases are thus diluted and cooled before their passage into the preheater *a* through the ports n^1. These gases escape into the flue *p* and chimney *q*. Local overheating and carbonisation in the preheater *a* is thus avoided. The heating-gas circuit comprising the flues *i*, *e*, e^1, c^1 and c^2 is thus in communication with the furnace *k* only through two small flues *l* and *o*. The apparatus is used to carry out the process described in Specification No. 220,664 (*see* The Chemical Age, Vol. XI, p. 329).

240,224. Scrubbers for Scrubbing Gases and Vapours. W. A. S. Calder, Ravensthorpe, Harborne, Birmingham, and W. H. Palmer, 208, Londonderry Lane, Smethwick, Birmingham. Application date, June 24, 1924.

This apparatus is particularly suitable for scrubbing the acid mist resulting from the evaporation of sulphuric or other acid. The casing 1 contains scrubbing plates 8, 9, spaced apart by a grid 10 and held in position by frames 13, 14. The perforations 16 in the plate 8 are small to provide for the maximum pressure drop and maximum velocity through the first plate, and the perforations 17 in the plate 9 are large so that the pressure drop is small. The perforations are staggered so that the gas passing through the plate 8 impinges against an unperforated portion of the plate 9. The perforations 16 may be $\frac{1}{16}$ inch, and the perforations 17 may be $\frac{1}{8}$ inch, while the plates are spaced $\frac{1}{16}$ to $\frac{1}{8}$ inch apart. A number of supplementary baffle plates 18 are also provided,



having perforations 27 spaced $\frac{1}{8}$ inch apart, and staggered in successive plates. The gas passes through the casing from the inlet 2 to the outlet 3. The plates 8 and 9 cause the liquid particles in the gas to agglomerate, and these plates together with the plates 18 collect and separate the liquid particles, which flow out through the drainage pipe 4. The pressure of gas supplied to the scrubber may be 4–8 inches of water, so that the velocity in passing through the first plate is 40–150 feet per second. The greatest efficiency is obtained by using only one scrubber set.

240,315. Disperse Systems, Process of making. O. Y. Imray, London. From Society of Chemical Industry in Basle, Switzerland. Application date, November 3, 1924.

This comprises a process for making disperse systems in which the dispersing agent is an aqueous solution of a salt of a mono or unsymmetrical diacylated diamine. These diamines such as are described in Specifications Nos. 203,608 and 219,304 (see The Chemical Age, Vol. IX, p. 401 and Vol. XI, p. 299) in the form of their aqueous salt solutions have the property of converting substances which are insoluble in water into a finely divided or colloidal condition, which is retained for some considerable time. Some of these solutions may act as protective colloids for making colloidal solutions of gold, platinum, silver chloride, etc. In an example, a solution of diethylamino - ethylimino - dicarboxylic-acid - dimenthyl-ester-hydrochloride is shaken with a solution of camphor in olive oil, yielding a milky emulsion which is applicable for therapeutic purposes, and is stable. In other examples, metacresol is treated with linoleyl-diethylethylene-diamide-hydrochloride; camphor is treated with diethyl-amino-ethylimino-dicarboxylic-acid dicyclohexyl carbinol-ester-hydrochloride; silver nitrate is treated with oleyldi-ethyl-ethylene-diamide-hydrochloride, yielding a clear solution of silver chloride. Some examples of the conversion of oils into colloidal solutions are also given.

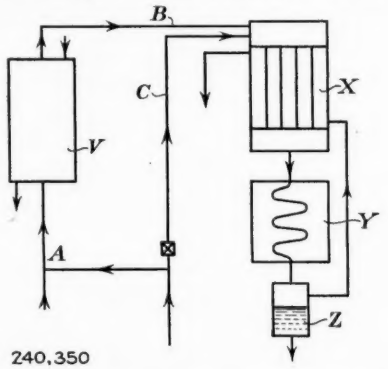
240,318. Water-Soluble Condensation Products, Manufacture of. O. Y. Imray, London. From Farbwerke vorm. Meister, Lucius, und Brüning, Hoechst-on-Main, Germany. Application date, November 8, 1924.

These products are obtained by the action of benzyl chloride on naphthalene sulphonic acids in the presence of sulphuric acid, and removal of the mineral acid after condensation.

Similar products can be obtained by first preparing the condensation product (a resinous oil) from naphthalene and benzyl chloride, and sulphonating the product. Powerful sulphonating agents are used, *e.g.*, oleum or a mixture of oleum and chlorosulphonic acid. If ordinary sulphuric acid is used for the sulphonation, a further condensation to hard, solid, resins occurs, but in the present process this further resinification is impeded so that the product is completely soluble in water. The products have a wide application in dyeing and in pharmacy, *e.g.*, as emulsifying and frothing agents. The benzyl chloride may be replaced by benzylbromide, xylylchloride, and similar arylalkyl halides or aryl halides having reactive halogen, *e.g.*, dichlorodihydronaphthalene. The naphthalene may be replaced by similar aromatic polynucleal hydrocarbons, *e.g.*, methylnaphthalene, tetrahydronaphthalene, anthracene, etc. Some detailed examples are given.

240,350. Synthesis of Ammonia, Drying Gases for. Synthetic Ammonia and Nitrates, Ltd., R. E. Slade, and V. E. Parke, Billingham, Stockton-on-Tees, Durham. Application date, January 28, 1925.

A nitrogen-hydrogen mixture prepared for the synthesis of ammonia usually contains water vapour, owing to its preliminary purification by means of aqueous solutions. Further, when the ammonia is removed from the circulating gases by absorption in water, the gases also become charged with water vapour. The water vapour must be removed from the nitrogen-hydrogen mixture owing to its harmful effect on the catalyst. If the removal of water vapour is



240,350

attempted by cooling, such cooling must be substantially below 0° C., since the vapour pressure of water even at 0° C. is 4·5 mm. of mercury, and the resulting separation of ice would lead to the stopping of the cooling tubes. In this invention, the moist gases are cooled substantially below 0° C. in the presence of a small proportion of ammonia, so that the condensed water contains ammonia in solution. The freezing point of such a solution is far below that of pure water, so that the water can be removed in liquid form. As the mixed gases are to be used for the synthesis of ammonia, it is not necessary to remove the ammonia which has been added. A very small proportion of ammonia is added, *e.g.*, 0·1 per cent., and $\frac{1}{10}$ths of this amount may remain in the dried gases.

Synthetic ammonia is removed from the circulating gases by scrubbing with water in a tower V, the make-up gases are added at A, and the moist gas leaves at B. Some of the gaseous ammonia is added through a by-pass pipe C, *e.g.*, 0·01–0·1 per cent. by volume, and the gases pass through a heat interchanger X in indirect contact with the gases which have been subjected to refrigerative drying. The gases leave the tower V at about 25° C., and the heat interchanger X at about 0° C., and then pass through a coil Y where they are cooled to −10° C. The ammoniacal condensate collects in a vessel Z, and cold dry gas passes back to the heat interchanger X. Gases dried in this way contain only 1–5 parts of water vapour per 100,000 parts of gas.

240,355. Oil Cracking Stills. W. J. Mellersh-Jackson, London. From Sinclair Refining Co., 45, Nassau Street, Manhattan, New York. Application date, February 16, 1925.

The process is for cracking petroleum hydrocarbons of high boiling point such as gas-oil. In the furnace in which coal, gas, or oil is burned the greatest efficiency is obtained with the least amount of excess air and the maximum furnace temperature. High temperatures are, however, objectionable in the stills owing to the deposition of carbon from the oil, and the overheating of the tubes which may follow. In the present invention, the maximum furnace efficiency is obtained without overheating of the still tubes. Part of the hot flue gases from near the heating chamber is mixed with the products of combustion in the furnace to reduce the temperature in these gases. More intense combustion and an increased temperature are obtained by supplying preheated air to the furnace, but the products of combustion are cooled before coming into contact with the still by dilution with the returned flue gases. In this manner, a reduction of temperature is obtained without the reduction in efficiency which would occur if an excess of cold air were used for combustion. The process is particularly applicable to tubular cracking stills. In this case, the tubes are arranged in a vertical heating flue through which the hot gases pass downwards, and the heat interchanger for heating the air may also be arranged in a vertical flue. The temperature of the exhaust flue gases is about 800° F., and these are mixed with the combustion gases, which are considerably above 2,400° F., to reduce them to about 2,000 F. Little modification of the usual furnace structure is required, the flue gases being returned through flues in the walls, floors, or linings of the furnace, the amount being regulated by a blower or steam jet.

240,371. Nucleal Condensation Products from α-Naphthol and Cyanuric Halides, Manufacture of. Soc. of Chemical Industry in Basle, Switzerland. H. Fritzsche, 64, Batterieweg, Switzerland, and P. Schaedeli, 116, Unterer Rheinweg, Basle, Switzerland. Application date, March 20, 1925. Addition to 220,302.

Specification No. 220,302 (see The Chemical Age, Vol. XI, p. 380) describes the manufacture of nucleal condensation products by condensing cyanuric halide with α-naphthol in the presence of a condensing agent, with or without a diluent. The product is sometimes treated with a compound having a mobile hydrogen atom. In this invention, 1–2 molecular proportions of α-naphthol and 2–1 molecular proportions of any other aromatic compound which tends to yield nucleal condensation products are treated with 1 molecular proportion of cyanuric halide in the presence of a condensing agent such as aluminium chloride. These products are intermediates for the manufacture of dyestuffs. In an example, a mixture of cyanuric chloride and aluminium chloride is added to carbon bisulphide, and α-naphthol then added. The product is separated from the diluent, and treated with a mixture of xylene commercial mixture and aluminium chloride. The product is probably 2 : 4-diparaoxynaphthyl-6-xylyl-1 : 3 : 5-triazine, and it is purified by solution in caustic soda and precipitation by acid. It is a red-brown powder soluble in caustic soda lye to a yellow solution, and in concentrated sulphuric acid to a red-violet solution. Several other examples are given.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to objection under the International Convention :—220,651 (Synthetic Ammonia and Nitrates, Ltd.), relating to removal of carbon monoxide from gaseous mixtures by means of cuprous solutions, see Vol. XI, p. 428; 223,221 and 236,146 (J. D. Riedel Akt.-Ges.), relating to manufacture of barbituric acid derivatives, see Vols. XI, p. 630, and XIII, p. 232; 225,821 (I. W. Cederberg), relating to a process for the catalytic combustion of ammonia-oxygen mixtures, see Vol. XII, p. 138; 231,885 (Farbenfabriken vorm. F. Bayer and Co.), relating to manufacture of disazo dyes, see Vol. XII, p. 616; 235,598 (Farbenfabriken vorm. F. Bayer und Co.), relating to arylesters of nitro-aminosulphonic acids of the benzene series, see Vol. XIII, p. 177.

International Specifications not yet Accepted

238,889. Active carbon. Metallbank und Metallurgische Ges., Akt.-Ges., 45, Bockenheimer Anlage, Frankfort-on-Main, Germany. International Convention date, August 20, 1924.

Wood or nut-shells are impregnated with zinc chloride and carbonised to obtain active carbon of high mechanical resistance.

238,900. HYDRATED PRODUCTS OF OLEFINES. Röchlingsche Eisen- und Stahlwerke Akt.-Ges., Völklingen, Saar, Germany. International Convention date, August 23, 1924.

These products are obtained by heating olefines with water to 150°-250° C. at pressures of 70-200 atmospheres. The water is preferably acidulated.

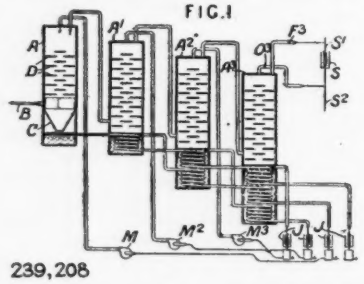
239,178. FATTY ACIDS. W. C. H. Pataky, 22, Raamweg, The Hague, and F. J. Nellensteijn, 15, Cornelis Trompstraat, Delft, Holland. International Convention date Aug. 27, 1924.

Fatty acids produced by the oxidation of hydrocarbons by an oxidising gas, with or without a catalyst, are distilled off during oxidation by adding superheated steam or nitrogen to the oxidising gas. The reaction is carried out at 160°-250° C. In an example, paraffin is heated to 180°-200° C., and oxygen passed into it with strong agitation. External heating may be stopped after the reaction is started, and superheated steam added to the oxygen. The temperature is maintained at about 250° C. The distillate separates into a solid containing acids of high molecular weight, and a liquid containing acids of low molecular weight.

239,208. FRACTIONAL CONDENSATION OF HYDROCARBON VAPOURS. Power Speciality Co., 111, Broadway, New York. (Assignees of J. E. Bell, 133, 8th Avenue, Brooklyn, New York.) International Convention date, August 27, 1924.

A mixture of oil and vapour from a heater is injected tangentially at B above a conical baffle C in a vapour separator A. The vapour passes over baffles D and then into a series of condensers A^1, A^2, A^3 which are progressively cooler. The condensate in each condenser is passed through coils in the

FIG. 1



239,208

bottom of the next condenser to heat the condensate therein, and then through coolers J. The liquid is then forced by pumps M, M^2, M^3 to the top of the condensers to serve as reflux liquid. The vapour passes from A^3 to a cooling coil S, and some of the condensate is returned to the condenser A^3 through a pipe O^3.

LATEST NOTIFICATIONS.

241,527. Manufacture of new secondary disazo dyestuffs. Farbenfabriken vorm. F. Bayer and Co. October 20, 1924.

241,572. Manufacture of dyestuffs. Soc. of Chemical Industry in Basle. October 16, 1924.

241,579. Manufacture of alkali salts of the halogenated amides of aromatic sulphonic acids. Farbenfabriken vorm. F. Bayer and Co. October 18, 1924.

241,580. Manufacture of mixtures yielding salts of sulphohalogenamides. Farbenfabriken vorm. F. Bayer and Co. October 18, 1924.

Specifications Accepted with Date of Application

220,953. Thymol from *p*-cymene, Process for the preparation of. G. Austerweil. August 21, 1923.

225,199. Chemically pure aluminium compounds, Process for the production of. C. Asseev. November 21, 1923.

225,216. Polymerisation of resin forming constituents of naphthas, Process for. Barrett Co. November 23, 1923.

225,544. Indigoid dyestuffs of the anthraquinone series and intermediate products, Manufacture of. Soc. of Chemical Industry in Basle. November 30, 1923. Addition to 210,413.

231,179. Electrolytic manufacture of iron. Le Fer Soc. Anon. Mar. 24, 1924.

231,501. Phenol and formaldehyde, Process for the preparation of a clear and transparent infusible condensation product from. A. Danilowitsch and G. Petroff. March 25, 1924.

231,807. Cellulose derivatives, Manufacture of. L. Lilienfeld. April 4, 1924.

232,958. Colourless compounds containing sulphur and suitable for adsorption on textile fibres and other substrata. Akt.-Ges. für Anilin Fabrikation. April 24, 1924.

238,520. Acetaldehyde, Process for the manufacture of. Soc. Chimique des Usines du Rhône. August 14, 1924.

240,624. Cellulose acetate, Process for the manufacture of. L. A Levy. April 9, 1924.

240,888. Ores, concentrates and metallurgical products, Treatment of. H. T. Durant and P. W. Rhodes. May 8, 1924.

240,891. Eliminating hydrogen sulphide and other impurities from fuel gas and from air, Process and apparatus for. W. J. Mellersh Jackson. (*Koppers Co.*) June 5, 1924.

240,929. Concentration of ores. H. Lavers and Minerals Separation, Ltd. July 12, 1924.

240,955. Methanol and higher alcohols, Synthetic manufacture of. J. Y. Johnson. (*Badische Anilin und Soda Fabrik.*) July 29, 1924.

240,968. 4-amino-3-oxybenzene-1-arsinic acids, Manufacture of. A. J. Ransford and A. Carpmael. (*Cassella and Co., Ges.*) August 6, 1924.

240,969. Arsinic acids of the aromatic series, Manufacture of. A. J. Ransford and A. Carpmael. (*Cassella and Co. Ges.*) August 6, 1924.

241,071. Obtaining ammonia from synthesis gases. Synthetic Ammonia and Nitrates, Ltd., R. E. Slade and K. Gordon. January 30, 1925.

241,123. Urea, Process for the production of. L. Casale. December 23, 1924.

241,135. Ammonia, Catalytic oxidation of. J. Y. Johnson. (*Badische Anilin und Soda Fabrik.*) June 19, 1925.

Applications for Patents

Akt.-Ges. für Anilin-Fabrikation. Manufacture of photographic silver-halide emulsions. 26,501. October 22. (Germany, January 31.)

Badische Anilin- and Soda-Fabrik and Johnson, J. Y. Manufacture of organic compounds containing oxygen. 26,083. October 19.

Badische Anilin- and Soda-Fabrik and Johnson, J. Y. Manufacture of gas mixtures for catalytic reactions. 26,593. October 23.

Bamburg, G. Manufacture of soap, etc. 26,686. October 24.

British Celanese, Ltd. Treatment of cellulose derivatives, etc. 26,576. October 23.

Caird, M. N., Coombs, E., and Grimble, F. Centrifugal separators. 26,199. 26,200. October 20.

Carbide and Carbon Chemicals Corporation. Glycol ethers and cellulose-ester solvents. 26,378. October 21. (United States, July 20.)

Cassella and Co., Ges., L., and Ransford, A. J. Manufacture of organic phosphorous compounds. 26,248. October 20.

Chemische Fabrik Griesheim-Elektron. Production of phosphoric acid. 26,194. October 20. (Germany, October 23, 1924.)

Crump, J. W., and Damard Lacquer Co., Ltd. Accelerators for hardening phenol-urea products. 26,618. October 23.

Ellis, G. H. Treatment of cellulose derivatives, etc. 26,576. October 23.

Fassini, A. Methods of drying artificial filaments. 26,461. October 22. (Italy, October 23, 1924.)

Gregory, A. W. Treatment of ores for recovery of titanium, tungsten, etc. 26,189. October 29.

Harrison, W. Production of carbohydrate compounds. 26,637. October 24.

Hazeldon, J. N. Distillation plants. 26,315. October 21.

Hirchberg, L. M. Manufacture and use of insecticides, etc. 26,688. October 24.

Karpen and Bros., S., and Wade, H. Manufacture of methylals. 26,620. October 23.

Karpen and Bros., S., and Wade, H. Manufacture of hexamethylenetetramine. 26,621. October 23.

Karpen and Bros., S., and Wade, H. Separation of hexamethylenetetramine from ammonium chloride. 26,622. 26,623. October 23.

Karpen and Bros., S., and Wade, H. Manufacture of phenolic condensation products. 26,624. 26,625. October 23.

Königsberger Zellstoff Fabriken und Chemische Werke Koholyt Akt.-Ges., and Schlumberger, E. Electrolytic decomposition of alkali-metal chloride solutions. 26,707. October 24.

Metallbank und Metallurgische Ges. Akt.-Ges. Apparatus for low-temperature distillation of fuel. 26,448. October 22. (Germany, November 4, 1924.)

Metals Production, Ltd., Taplin, B., and Edser, E. Heat treatment and concentration of ores. 26,274. October 21.

Moseley, H. R. W., J. W., and L. A. Process for rendering tar products, etc., non-inflammable. 26,541. October 23.

Peerless Productions, Ltd. Processes of dyeing. 26,367. October 21.

Rice, J. A. Porous cements, etc. 26,088. October 19.

Schotz, S. P. Waterproofing fabrics, etc. 26,569. 26,570. October 23.

Silica Gel Corporation. Adsorbing a gas or vapour from mixtures thereof. 26,507. October 22. (United States, September 4.)

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, October 30, 1925.

THE improvement in trade which we have noted in our recent reports has been maintained. There is a steady appreciation of demand and the outlook is healthier than it has been for some time.

There is some export inquiry, but the actual business passing is very small.

General Chemicals

ACETONE has advanced in price and is now quoted at £78 to £80 per ton.

ACID ACETIC is in steady demand, technical at £37 to £38 per ton, and pure at £38 to £40 per ton for 80% grades.

ACID FORMIC is in fair demand at £46 to £47 per ton for 85%.

ACID LACTIC is unchanged at £43 to £44 per ton for 50% by weight.

ACID OXALIC remains a weak market at 3½d. to 3⅝d. per lb. This price apparently leaves the makers with a loss and there is no doubt that an improvement will come suddenly.

ALUMINA SULPHATE.—Some considerable business is passing at recent prices.

AMMONIUM CHLORIDE is weak and uninteresting.

ARSENIC.—The market is lifeless. Price continues to sag.

BARIUM CHLORIDE has advanced in price and is now £8 10s. to £8 15s. per ton.

BLEACHING POWDER is very active and the booking of contracts for next year's delivery is in full swing.

EPSOM SALTS are firm at £5 10s. per ton.

FORMALDEHYDE is very scarce and is quoted at £43 to £44 per ton, tending upwards.

LEAD ACETATE is firmer, white at £46 per ton and brown at £45 to £45 10s. per ton.

LIME ACETATE is firmer, some second-hand parcels having been removed from the market, and is quoted at £15 per ton, basis 80%.

LITHOPONE unchanged at £19 10s. to £20 per ton.

POTASSIUM CARBONATE AND CAUSTIC are unchanged and in small demand.

POTASSIUM CHLORATE.—The spot market is still bare, occasional parcels commanding 4¼d. to 4½d. per lb.

POTASSIUM PERMANGANATE is weak at about 7½d. per lb.

POTASSIUM PRUSSIATE is steady, quotations being 7½d. per lb.

SODIUM ACETATE is quiet at £17 10s. per ton.

SODIUM BICHROMATE.—A large volume of business is reported and many of the contracts for next year have now been placed.

SODIUM HYPOSULPHITE is quiet.

SODIUM NITRITE is in steady but small demand at £22 10s. per ton.

SODIUM PRUSSIATE is 4½d. to 4⅝d. per lb., and is weak. Some makers are holding off the market in anticipation of higher prices.

SODIUM SULPHIDE is uninteresting.

ZINC SULPHIDE is unchanged.

Coal Tar Products

The general tone of the market for coal tar products is firm, and there is little change to report from last week.

90% BENZOL is unchanged at 1s. 8d. per gallon on rails.

PURE BENZOL is quoted at 1s. 11d. to 2s. per gallon on rails.

CREOSOTE OIL is firm at 6d. per gallon on rails in the North, while the price in the South is 7d. to 7¼d per gallon.

CRESYLIC ACID is steady, the pale quality 97/99% being quoted at 1s. 6d. to 1s. 7d. per gallon on rails, while the dark quality 95/97% is worth about 1s. 2d. per gallon on rails.

SOLVENT NAPHTHA can be bought at 1s. 4d. per gallon on rails.

HEAVY NAPHTHA is quoted at 1s. 1d. per gallon on rails.

NAPHTHALENES are in fairly good demand, the lower grades being worth from £4 to £4 10s. per ton, while the 76/78° quality is worth about £6 per ton, and the 74/76° quality about £5 10s. per ton.

PITCH is unchanged, the demand is satisfactory; prices are maintained at 40s. to 42s. 6d. per ton, f.o.b. main U.K. ports.

Latest Oil Prices

LONDON.—LINSEED OIL closed firm and 5s. to 7s. 6d. higher. Spot, £37 10s.; October to December, £36 5s.; January-April, £36 10s.; May-August, £36 5s. RAPE OIL quiet. Crude, crushed, spot, £47 10s.; technical refined, £50 10s. COTTON OIL quiet. Refined common edible, £46; Egyptian, crude, £39; deodorised, £48. TURPENTINE quiet and 3d. per cwt. lower. American, spot, 76s.; November-December, 76s. 3d.; and January-April, 78s. 3d., sellers.

HULL.—LINSEED OIL, naked, spot, to January-April, £36 2s. 6d. COTTON OIL, naked Bombay, crude, £35; Egyptian, crude, £36 10s.; edible, refined, £39; technical, £38 5s. PALM KERNEL OIL, crushed, naked, 5½ per cent., £41. GROUNDNUT OIL, crushed/extracted, £46; deodorised, £50. SOYA OIL, extracted and crushed, £40 10s.; deodorised, £44; RAPE OIL, extracted and crushed, £46 10s. per ton, net cash terms, ex mills. CASTOR OIL, pharmaceutical, 55s. to 55s. 6d.; first, 50s. to 50s. 6d.; and second, 46s. to 48s. 6d. per cwt. COD OIL unaltered.

Nitrogen Products Market

Export.—During the last week the demand for export has been fairly quiet, but the market continues firm and producers have made small sales on the basis of £12 5s. per ton f.o.b. U.K. port in single bags.

Home.—The home demand continues quiet. Prices are unchanged. The heavy sales earlier in the year indicate that the total home demand for the 1925–6 season will be at least 10,000 tons above those for the previous year.

Nitrate of Soda.—The market continues quiet. Cargoes c.i.f. chief European ports have changed hands at about £11 8s. per ton for prompt arrival. Slightly higher prices are quoted for later arrival.

American Market Movements

(From *Drug and Chemical Markets.*)

TECHNICAL Epsom salts easier. Sodium fluoride shaded. Ammonium persulphate offered by domestic manufacturer. Ammonium chloride quiet. Domestic makers report a heavy demand for most heavy chemicals. Light oils unchanged. Benzene easy. Solvent naphtha and xylene very tight. Pyridine fairly steady. Cresylic acid lower. Intermediates quiet. Ortho-toluidine firm. Meta-nitro-para-toluidine down.

Trading in fine chemicals has fallen off somewhat but prices are generally firm. Quicksilver has recovered slightly and codliver oil is easier. Price changes are numerous in essential oils with many advances due to scarcity of products and speculation.

Public Service

Candidates in the Chemical and Allied Industries

DULY nominated candidates for the forthcoming municipal elections include the following names:—Wallsend, South Ward, Mr. C. Revley, mineral water manufacturer. Middlesbrough, Exchange Ward, Mr. S. A. Sadler, chemical manufacturer.

Manchester.—Didsbury, Dr. Herbert Levenstein, aniline dyestuffs manufacturer; Longsight, Mr. W. Cundiff, chemical manufacturer; Newton Heath, Mr. H. F. Robinson, manufacturing chemist; St. John's, Mr. T. R. Hewlett, chemical manufacturer.

Salford.—Mr. W. Crossley, dyeworks secretary. Leeds.—Roundhay, Mr. D. Crockatt, dyer; Exchange, Mr. J. F. McHugh dyer's operative; Eccleshill, Mr. H. Child, operative dyer; North, Mr. W. H. Crossley, dyer's warehouseman; Tong, Mr. W. E. Tetley, chemical manufacturer's traveller.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£20 per ton.
Acid Boric, Commercial.—Crystal, £40 per ton, Powder, £42 per ton.
Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.
Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations : 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
Bleaching Powder.—Spot, £10 10s. d/d ; Contract, £8 10s. d/d, 4 ton lots.
Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.
Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
Calcium Chlorate (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.
Copper Sulphate.—£25 to £25 10s. per ton.
Methylated Spirit 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
Nickel Sulphate.—£38 per ton d/d.
Nickel Ammonia Sulphate.—£38 per ton d/d.
Potash Caustic.—£30 to £33 per ton.
Potassium Bichromate.—5d. per lb.
Potassium Chlorate.—3¾d. per lb., ex wharf, London, in cwt. kegs.
Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.
Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.
Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength ; 30s. less for contracts.
Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.
Sodium Acetate 97/98%.—£21 per ton.
Sodium Bicarbonate.—£10 10s. per ton, carr. paid.
Sodium Bichromate.—4d. per lb.
Sodium Bisulphite Powder 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.
Sodium Chlorate.—3d. per lb.
Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool.
Sodium Nitrite 100% basis.—£27 per ton d/d.
Sodium Phosphate, £14 per ton, f.o.r. London, casks free.
Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.
Sodium Sulphide conc. solid. 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. pd.
Sodium Sulphide Crystals.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. pd.
Sodium Sulphite, Pea Crystals.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—4¾d. per lb. Crude 60's, 1s. 3d. to 1s. 4d Very poor demand.
Acid Cresylic 97/99.—1s. 6d. to 1s. 7d. per gall. Pale, 95%, 1s. 6d. per gall. Dark, 1s. 6d. per gall. Good demand.
Anthracene Paste 40%.—3d. per unit per cwt.—Nominal price. No business.
Anthracene Oil, Strained.—10d. per gall. Good inquiry. Unstrained, 7d. to 7½d. per gall.
Benzol.—Crude 65's.—11d. to 1s. 3d. per gall., ex works in tank wagons. Standard Motor, 1s. 8d. to 1s. 10d. per gall., ex works in tank wagons. Pure, 1s. 11d. to 2s. 3d. per gall., ex works in tank wagons. Firm.
Toluol.—90%, 1s. 9d. per gall. More inquiry. Pure, 1s. 11d. to 2s. 2d. per gall.
Xylol Commercial.—1s. 11d. to 2s. 3d. per gall. Pure, 2s. 3d. to 3s. 3d. per gall.
Creosote.—Cresylic, 20/24%, 8d. per gall. Market very quiet. Standard specification, 6d. to 7d. per gall.; middle oil, heavy, 5¾d. to 6d. per gall. Market steady.
Naphtha.—Crude 9¾d. per gall. Solvent 90/160, 1s. 6¼d. to 1s. 10d. per gall. Fair business. Solvent 90/190, 1s. 0¼d. to 1s. 6d. per gall. Moderate demand.
Naphthalene Crude.—Drained Creosote Salts, £3 15s. to £5 per ton. Whizzed or hot pressed, £4 10s. to £5. Better inquiry.
Naphthalene.—Crystals and Flaked, £12 to £13 per ton, according to districts.
Pitch.—Medium soft, 36s. to 47s. 6d. per ton, according to district. Moderate demand.
Pyridine.—90/160, 19s. to 19s. 6d. per gall. Fair demand. Heavy, 10s. 6d. per gall. More inquiry.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.
Acid Amidonaphthol disulpho (1-8-2-4).—10s. 9d. per lb.
Acid Anthranilic.—7s. per lb. 100%.
Acid Benzoic.—1s. 9d. per lb.
Acid Gamma.—9s. per lb.
Acid H.—3s. 6d. per lb. 100% basis d/d.
Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.
Acid Neville and Winther.—4s. 9d. per lb. 100% basis d/d.
Acid Sulphanilic.—8¼d. per lb. 100% basis d/d.
Aluminium Chloride, anhydrous.—10d. per lb. d/d.
Aniline Oil.—7½d. per lb. naked at works.
Aniline Salts.—8d. per lb. naked at works.
Antimony Pentachloride.—1s. per lb. d/d.
Benzaldehyde.—2s. 1¾d. per lb. Good home inquiry.
Benzidine Base.—3s. 6d. per lb. 100% basis d/d.
Benzyl Chloride 95%.—1s. 1d. per lb.
p-Chlorphenol.—4s. 3d. per lb. d/d.
p-Chloraniline.—3s. per lb. 100% basis.
o-Cresol 29/31° C.—3d. per lb. Demand quiet.
m-Cresol 98/100%.—2s. 1d. per lb. Demand moderate.
p-Cresol 32/34° C.—2s. 1d. per lb. Demand moderate.
Dichloraniline.—2s. 3d. per lb.
Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.
Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
Dimethylaniline.—2s. per lb. d/d. Drums extra.
Dinitrobenzene.—9d. per lb. naked at works.
Dinitrochlorbenzene.—£84 10s. per ton d/d.
Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 10d. per lb. naked at works.
Diphenylaniline.—2s. 10d. per lb. d/d.
G. Salt.—2s. 2d. per lb. 100% basis d/d.
a-Naphthol.—1s. 10d. per lb. d/d. Fair home inquiry.
B-Naphthol.—1s. per lb. d/d. Fair home inquiry.
a-Naphthylamine.—1s. 3d. per lb. d/d. Fair home inquiry.
B-Naphthylamine.—3s. 9d. per lb. d/d. Fair home inquiry.
m-Nitraniline.—3s. 9d. per lb. d/d.
p-Nitraniline.—1s. 11d. per lb. d/d. Fair home inquiry.
Nitrobenzene.—5d.to 5¼d.per lb.naked at works. Good home inquiry.
o-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.
Nitronaphthalene.—10d. per lb. d/d.
p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.
m-Phenylene Diamine.—4s. per lb. d/d.
p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.
R. Salt.—2s. 4d. per lb. 100% basis d/d.
Sodium Naphthionate.—1s. 7¼d. to 1s. 8d. per lb. 100% basis d/d.
o-Toluidine.—9d. per lb. Good home inquiry.
p-Toluidine.—2s. 3d. per lb. naked at works.
m-Toluylene Diamine.—4s. per lb. d/d.
m-Xylidine acetate, 2s. 11d. per lb. 100%.

Wood Distillation Products

Acetate of Lime.—Brown £8. Quiet market. Grey, £14 10s. per ton. Liquor, 9d. per gall. 32° Tw.
Acetone.—£73 per ton.
Charcoal.—£7 to £9 per ton, according to grade and locality. Demand fair.
Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall, 24° Tw.
Red Liquor.—10d. to 1s. per gall. 15° Tw.
Wood Creosote.—2s. 7d. per gall. Unrefined.
Wood Naphtha, Miscible.—5s. per gall.
60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.
Wood Tar.—£3 15s. to £5 per ton, according to grade.
Brown Sugar of Lead.—£40 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 7¼d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.
Arsenic Sulphide, Yellow.—2s. per lb.
Barytes.—£3 10s. to £6 15s. per ton, according to quality.
Cadmium Sulphide.—4s. 4d. per lb.
Carbon Bisulphide.—£25 to £28 per ton, according to quantity.
Carbon Black.—5½d. per lb., ex wharf.
Carbon Tetrachloride.—£55 to £60 per ton, according to quantity, drums extra.
Chromium Oxide, Green.—1s. 3d. per lb.
Diphenylguanidine, 4s. to 4s. 3d. per lb.
Indiarubber Substitutes, White and Dark.—5¾d. to 6¾d. per lb.
Lamp Black.—£43 per ton, barrels free.
Lead Hyposulphite.—9d. per lb.
Lithopone, 30%.—£22 10s. per ton.
Mineral Rubber "Rubpron."—£13 12s. 6d. per ton f.o.r. London.
Sulphur.—£9 to £11 per ton, according to quality.

Sulphur Chloride.—4d. per lb., carboys extra.
Sulphur Precip. B.P.—£50 to £55 per ton.
Thiocarbamide.—2s. 6d. to 2s. 9d. per lb.
Thiocarbanilide.—2s. 1d. to 2s. 3d. per lb.
Vermilion, Pale or Deep.—5s. per lb.
Zinc Sulphide.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

Acid, Acetic, 80 % B.P.—£39 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—2s. 6½d. to 2s. 8d. per lb. Keen competition continuing. Good demand.
Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.
Acid, Boric B.P.—Crystal £46 per ton, Powder £50 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4d. per lb., less 5%. Unsettled.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots.
Acid, Pyrogallic, Crystals.—5s. 6d. per lb. Resublimed 9s.
Acid, Salicylic.—1s. 4d. to 1s. 6d. per lb. Technical.—10½d. to 11d. per lb.
Acid, Tannic B.P.—2s. 10d. per lb.
Acid, Tartaric.—1s. 0½d. per lb., less 5%. Market firm.
Amidol.—6s. 6d. per lb., d/d.
Acetanilide.—1s. 5d. per lb. for quantities.
Amidopyrin.—12s. 9d. per lb.
Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.
Atropine Sulphate.—11s. 6d. per oz. for English make.
Barbitone.—10s. 3d. to 10s. 6d. per lb.
Benzonaphthol.—3s. 3d. per lb. spot.
Bismuth Carbonate.—12s. 9d. to 14s. 9d. per lb.
Bismuth Citrate.—11s. 4d. to 13s. 4d. per lb.
Bismuth Salicylate.—10s. 2d. to 12s. 2d. per lb.
Bismuth Subnitrate.—10s. 9d. to 12s. 9d. per lb. according to quantity.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 10d. to 2s. per lb.; sodium, 2s. 1d. to 2s. 3d. per lb.; ammonium, 2s. 5d. to 2s. 7d. per lb., all spot. British or Imported. Firm.
Calcium Lactate.—1s. 3½d. to 1s. 5d. B.P. 2s. 8d. to 3s., according to quantity.
Chloral Hydrate.—3s. 5d. to 3s. 6d. per lb., duty paid.
Chloroform.—2s. 5½d. to 2s. 7½d. per lb., according to quantity.
Creosote Carbonate.—6s. per lb.
Formaldehyde.—£41 per ton, in barrels ex wharf.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 60%, 2s. 6d. per lb.
Guaiacol Carbonate.—6s. to 7s. per lb.
Hexamine.—2s. 5d. per lb.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon f.o.r. makers' works, naked.
Hydroquinone.—4s. 4½d. per lb., in cwt. lots.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—1s. 8d. to 1s. 11d. per lb. Green, 2s. 2d. to 2s. 7d. per lb. U.S.P., 1s. 7d. to 1s. 10d. per lb.
Magnesium Carbonate.—Light Commercial, £33 per ton net.
Magnesium Oxide.—Light Commercial, £70 per ton, less 2½%, price reduced; Heavy Commercial, reduced to £23 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
Menthol.—A.B.R. recrystallised B.P., 46s. net per lb., October delivery. Synthetic, 22s. 6d. to 27s. 6d. per lb., according to quality. English make. Very heavy demand.
Mercurials.—Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb. Still quiet.
Methyl Salicylate.—1s. 8d. per lb. Demand increasing, price firmer.
Methyl Sulphonal.—16s. 9d. per lb.
Metol.—9s. per lb. British make.
Paraformaldehyde.—1s. 9d. for B.P. quality.
Paraldehyde.—1s. 4½d. per lb., in free bottles and cases.
Phenacetin.—4s. to 4s. 3d. per lb.
Phenazone.—6s. to 6s. 3d. per lb. Spot lower than forward price.
Phenolphthalein.—4s. to 4s. 3d. per lb. Supply exceeds demand.
Potassium Bitartrate 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots. Market very firm.
Potassium Citrate.—1s. 7d. to 1s. 10d. per lb.
Potassium Ferricyanide.—1s. 8d. to 1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Steady market.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., spot. Slightly easier.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—3s. 10½d. per lb. In fair quantities.
Saccharin.—51s. 5d. to 53s. 8d. per lb., according to quantity. Fair demand.
Salol.—3s. per lb.
Silver Proteinate.—12s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb.
Sodium Citrate, B.P.C., 1911.—1s. 4d. to 1s. 7d. per lb., B.P.C., 1923. 1s. 7d. to 1s. 10d. per lb., according to quantity.
Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. to 80s. per cwt., according to quantity.
Sodium Salicylate.—Powder, 1s. 11d. to 2s. 1d. per lb. Crystal, 2s. to 2s. 2d. per lb. Flake, 2s. 2d. to 2s. 6d. per lb.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.
Sulphonal.—12s. per lb. Limited demand.
Thymol.—13s. to 15s. per lb.

Perfumery Chemicals

Acetophenone.—9s. per lb.
Aubepine (ex Anethol).—11s. per lb.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. 1½d. per lb.
Anethol (M.P. 21/22° C.).—6s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 4d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 4d. per lb.
Benzaldehyde free from Chlorine.—2s. 9d. per lb.
Benzyl Benzoate.—2s. 9d. per lb.
Cinnamic Aldehyde Natural.—15s. 6d. per lb.
Coumarin.—13s. per lb.
Citronellol.—16s. per lb.
Citral.—10s. per lb.
Ethyl Cinnamate.—9s. per lb.
Ethyl Phthalate.—3s. per lb.
Eugenol.—9s. 6d. per lb.
Geraniol (Palmarosa).—23s. 6d. per lb.
Geraniol.—8s. to 16s. per lb.
Heliotropine.—6s. 3d. per lb.
Iso Eugenol.—14s. 6d. per lb.
Linalol ex Bois de Rose.—18s. per lb.
Linalyl Acetate.—18s. per lb.
Methyl Anthranilate.—9s. 3d. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ketone.—40s. 6d. per lb.
Musk Xylol.—6s. per lb.
Nerolin.—4s. per lb.
Phenyl Ethyl Acetate.—14s. per lb.
Phenyl Ethyl Alcohol.—11s. 6d. per lb.
Rhodinol.—36s. 6d. per lb.
Safrol.—1s. 4d. per lb.
Terpineol.—1s. 8d. per lb.
Vanillin.—21s. 6d. to 23s. 6d. per lb. Good demand.

Essential Oils

Almond Oil.—12s. 6d. per lb.
Anise Oil.—3s. 9d. per lb.
Bergamot Oil.—27s. 6d. per lb.
Bourbon Geranium Oil.—15s. per lb.
Camphor Oil.—60s. per cwt.
Cananga Oil, Java.—11s. 3d. per lb.
Cinnamon Oil, Leaf.—5d. per oz.
Cassia Oil, 80/85%.—10s. 3d. per lb.
Citronella Oil.—Java, 85/90%, 3s. 5d.; Ceylon, 2s. 6d. per lb.
Clove Oil.—7s. 6d. per lb.
Eucalyptus Oil, 70/75%.—1s. 10d. per lb.
Lavender Oil.—French 38/40% Esters, 28s. per lb.
Lemon Oil.—6s. 9d. per lb.
Lemongrass Oil.—4s. 9d. per lb.
Orange Oil, Sweet.—10s. 9d. per lb.
Otto of Rose Oil.—Bulgarian, 60s. per oz. Anatolian, 35s. per oz.
Palma Rosa Oil.—13s. 9d. per lb.
Palma Rose Oil.—15s. 3d. per lb.
Peppermint Oil.—Wayne County. 80s. for shipment from U.S.A. Japanese, 28s. 9d. per lb. Market excited.
Petitgrain Oil.—9d. per lb.
Sandal Wood Oil.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, October 30, 1925.

DURING the past week business in the heavy Chemical Market has been rather quieter, although inquiries received for export have been more numerous.

Prices on the whole remain steady with the exception of zinc products, which have an upward tendency.

Industrial Chemica

ACID ACETIC.—In usual steady demand 98/100% quoted £55 to £67 per ton according to quality and packing, c.i.f. U.K. ports; 80% pure £40/£42 per ton; 80% technical £38 to £40 per ton. Packed in casks, c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated or small flaked, £40 per ton; Powdered, £42 per ton; packed in bags carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Good demand for export and prices unchanged at about 4½d. per lb., delivered or f.o.b. U.K. ports.

ACID CITRIC, B.P. CRYSTALS.—Now quoted 1s. 3¾d. per lb., less 5% ex store, in good demand.

ACID FORMIC. 85%.—Unchanged at about £46 per ton, ex wharf. Prompt shipment from the Continent.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80°.—Remains unchanged at £23 5s. per ton, ex station, full truck loads.

ACID OXALIC 98/100%.—In moderate demand and price unchanged at about 3½d. per lb., ex wharf. Offered for prompt shipment from the Continent at 3⅜d. per lb., ex wharf.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—In moderate demand and price nominally 11½d. per lb., less 5% ex wharf.

ALUMINA SULPHATE 17/18% IRON FREE.—Quoted £6 15s. per ton, ex store, spot delivery. Offered for prompt shipment from the Continent at £6 5s. per ton, c.i.f. U.K. ports.

ALUM, LUMP POTASH.—Quoted £7 15s. per ton, c.i.f. U.K. ports. Spot material available at £9 2s. 6d. per ton, ex store. Powdered quality on offer at £7 15s. per ton, ex wharf.

AMMONIA ANHYDROUS.—In moderate demand and price unchanged at 1s. 4½d. per lb. less 5%, ex station. Containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton. Powdered, £39 per ton. Packed in 5 cwt. casks, delivered U.K. ports.

AMMONIA LIQUID 880°.—In usual steady demand and price unchanged at 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey Galvanisers Crystals now quoted £27 10s. per ton, ex station. Offered from the Continent at about £23 5s. per ton, c.i.f. U.K. ports. Fine White Crystals quoted £19 5s. per ton, c.i.f., U.K. ports.

ARSENIC, REFINED WHITE CORNISH.—Prices still further reduced. Now quoted £19 per ton, ex wharf, early delivery. Spot material available at about £22 per ton, ex store.

BARIUM CHLORIDE.—Large White Crystals quoted £9 per ton, ex store. Spot delivery on offer from the Continent at about £7 15s. per ton, c.i.f. U.K. ports. Fine White Crystals quoted £7 5s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—English material quoted £9 10s. per ton, ex station; contracts 20s. per ton less. Offered from the Continent at £8 2s. 6d. per ton, c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £24 10s. per ton. Crystals, £25 per ton. Powdered, £26 per ton. Carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturers' price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental now easier at about £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—In good demand for export. Price unchanged at about £3 7s. 6d. per ton f.o.b. U.K. ports, packed in casks.

COPPER SULPHATE.—Spot material available at about £23 10s. per ton, ex wharf. English for export quoted £24 10s. per ton f.o.b. U.K. ports.

FORMALDEHYDE 40%.—Rather dearer. Now quoted £40 10s. per ton, c.i.f. U.K. ports. Prompt shipment. Spot material available at about £41 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental quoted £2 17s. 6d. per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material now quoted £44 10s. per ton, ex store.

LEAD, WHITE.—Unchanged at about £44 15s. per ton, ex store, spot delivery. Some cheaper parcels on offer for prompt shipment from the Continent at round about £43 per ton, ex wharf.

LEAD ACETATE.—White crystals offered from the Continent at £44 per ton, c.i.f. U.K. ports. Quoted £45 per ton, ex store, spot delivery.

MAGNESITE, GROUND CALCINED.—In moderate demand and price unchanged at about £8 15s. per ton, ex station.

POTASH CAUSTIC 88/92%.—Syndicate prices unchanged at £27 10s. per ton, c.i.f. U.K. ports. Spot material available at about £29 10s. per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

POTASSIUM CARBONATE 96/98%.—On offer from the Continent at about £25 15s. per ton, c.i.f. U.K. ports. Spot material available at £26 10s. per ton, ex store.

POTASSIUM CHLORATE 98/100%.—Offered from the Continent at £30 per ton, c.i.f. U.K. port for Powdered, £32 10s. Crystals. Only small quantities available for near delivery.

POTASSIUM NITRATE, SALTPETRE.—99% Refined Granulated quoted £24 15s. per ton, c.i.f. U.K. ports. Spot material available at about £27 5s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material quoted 8d. per lb., ex store. Offered for early delivery at 7¾d. per lb., ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Good inquiry and price advanced to about 7¼d. per lb., ex store. Offered for prompt shipment from the Continent at about 7¼d. per lb., ex wharf.

SODA CAUSTIC 76/77% now £17 10s. per ton, 70/72% £16 2s. 6d. per ton. Broken 60% £16 12s. 6d. per ton. Powdered 98/99% £20 17s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot material now quoted £18 10s. per ton ex store. Offered from the Continent at about £17 15s. per ton, c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM CARBONATE, SODA CRYSTALS, £5 to £5 5s. per ton, ex quay or station. Powdered or Pea quality £1 7s. 6d. per ton more. Alkali 58% £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture unchanged at £9 10s. per ton, ex station, minimum ton lots. Pea Crystals £14 per ton, ex station. Continental commercial quality quoted £9 5s. per ton, ex store.

SODIUM NITRATE.—Quoted £13 per ton, ex store. 96/98% Refined quality 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Quoted £24 per ton, ex store. Offered from the Continent about £22 5s. per ton, c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—In better demand and price advanced to about 4¼d. per lb., ex store. Still quoted 4d. per lb., ex wharf, prompt shipment.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English material. Solid 60/62%, now £13 per ton. Broken £14 per ton. Flake £15 per ton. Crystals £8 10s. per ton. Carriage paid U.K. stations, minimum 4-ton lots with slight reductions for contracts to the end of the year. 60/62% Solid offered from the Continent at £10 15s. per ton, c.i.f. U.K. ports. Broken £1 per ton more. 30/32% Crystals £7 15s. per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £10 10s.; Roll, £9 10s.; Rock, £9 7s. 6d.; Ground, £9 5s. per ton, ex store, spot delivery. Prices nominal.

ZINC CHLORIDE, 98/100%.—Quoted £23 per ton, c.i.f. U.K. port, prompt shipment from the Continent. English material 96/98% quoted £23 15s. per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Of continental manufacture on offer at about £11 15s. per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

N.W. ACID 4s. 9d. per lb. per 100%. Some home inquiries.

DIMETHYLANILINE, 2s. per lb. Fair home inquiries.

META XYLIDINE ACETATE, 2s. 11d. per lb. per 100%. Some home inquiries.

2 R. ACID, 10s. 6d. per lb. per 100%. Fair home inquiries.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, October 30, 1925.

There seems to be a more optimistic note among chemical traders here, restrained, naturally, in view of the disappointing experiences of the last few years. This is based upon the continued good news from the American cotton belt and the resulting brighter prospects for the Lancashire textile industry. Buying is of a quietly steady character, with prompt transactions in small or medium parcels predominating, though interest in forward contracts for the bread-and-butter lines of heavy chemicals is fairly active.

Heavy Chemicals

Sodium sulphide is still rather inactive, and values are easy though not quotably changed from last week, 60-65 per cent. concentrated solid being offered at £11 15s. per ton and commercial quality at £9 10s. Saltcake continues on offer at £3 10s. to £3 12s. 6d. per ton, but the demand for this material is on a moderate scale. Glauber salts are attracting comparatively little attention at about £3 10s. per ton. Chlorate of soda has an easy tendency at round 2¾d. per lb., and only a limited amount of business is being put through. Acetate of soda is weak at £17 10s. per ton and sales are slow. Soda crystals are selling in fair quantities and values keep steady at £5 5s. per ton. Hyposulphite of soda is rather quiet at about £14 10s. per ton for photographic crystals and £9 5s. per ton for commercial material. Prussiate of soda is maintained at round 4d. per lb., and a fair amount of business is reported. Alkali is in steady demand at £6 15s. per ton. Bleaching powder is currently offered at £9 10s. per ton and at £1 per ton less on 1926 contracts; demand at the moment is moderate. Bicarbonate of soda is quiet but steady at £10 10s. per ton. Phosphate of soda is in moderate request and values are unchanged at £12 10s. per ton. Caustic soda continues to meet with a quietly steady demand for both branches of trade at from £15 12s. 6d. per ton for 60 per cent. strength to £18 for 76-77 per cent., and 10s. per ton reduction for 1926 deliveries. Bichromate of soda is in moderate demand at 4d. per lb.

Caustic potash is attracting a limited amount of attention at £28 10s. per ton for 90 per cent. material. Carbonate of potash is held at £25 to £25 10s. per ton, and the demand for this material is maintained at its recent level. Permanganate of potash meets with some inquiry at about 7¾d. per lb. for B.P. quality and 5¾d. to 6d. per lb. for commercial. Chlorate of potash is fairly steady at 4d. per lb. with a moderate volume of business being done. Yellow prussiate of potash is firm at round 7¼d. per lb., demand being on a fair scale. Bichromate of potash is not particularly active at 5d. per lb.

Arsenic is still a quiet section, but though prices are easy the steady fall in values which has been so pronounced during the last month or so seems to have halted; white powdered, Cornish makes, continues to offer at about £16 10s. per ton on rails. Sulphate of copper is steady and in quiet request at £24 to £24 10s. per ton. Epsom salts are in limited demand at the unchanged price of £3 15s. per ton, with magnesium sulphate, pharmaceutical quality, quoted at about £5 5s. Acetate of lime is rather quiet at £14 10s. to £15 per ton for grey material and £7 10s. for brown. Acetate of lead is steady at £44 to £45 for white and round £39 for brown. Nitrate of lead is rather slow though still quoted at £41 to £42 per ton.

Acids and Coal Tar Products

Citric acid is steady and in fair inquiry at 1s. 3½d. to 1s. 4d. per lb. Tartaric acid is rather quiet at 11½d. to 1s. per lb. Oxalic acid is a shade better at 3¾d. per lb. Acetic acid meets with a moderately good demand at £38 per ton for 80 per cent. commercial quality and £66 to £67 for glacial.

Pitch continues slow with values nominally unchanged at round 40s. per ton. Solvent naphtha is not attracting a great deal of attention though values keep steady at 1s. 5½d. to 1s. 6d. per gallon. Carbolic acid keeps quiet at about 4½d. per lb. for crystal and 1s. 3d. to 1s. 4d. per gallon for crude. Naphthalenes are inactive though not much changed from recent price levels; refined is on offer at £12 to £13 per ton and crude from £4 per ton according to quality. Creosote oil is in fair request and fully maintained at 6d. to 6¼d. per gal.

British Cyanides Meet Competition

Losses Necessitate New Productions

Mr. C. F. Rowsell, chairman, presiding at the annual ordinary general meeting of British Cyanides, Ltd., in London on Wednesday, said that the financial year showed a loss of £18,716 as against £24,990 in the previous year, but practically £11,000 was due to depreciation. Business in cyanide products had suffered so much from competition, particularly American, that they had been compelled to turn to other products to re-establish the company successfully.

A Synthetic Syrup

They had formed another company with independent capital to exploit a synthetic syrup which was now being manufactured satisfactorily. British Cyanides would still manufacture the thio-carbamide and the synthetic syrup made from it, and the Beetle Products Co., Ltd., would develop its uses. In connection with the company's experiments for the production of nitrogen from the air, this scheme had to be abandoned for financial reasons. They hoped, however, to take it up again in the near future. With reference to the British Potash Co., he feared that a considerable amount of the £34,525 appearing in the balance-sheet would have to be written off as a loss. The chairman said that he was convinced that they would turn the very difficult corner at which they found themselves and would again experience prosperity.

Mr. Kenneth M. Chance said that they had arranged to sell the whole of their syrup to the Beetle Products Co. at a price showing a handsome profit. There was a large scope for moulding powders, and it now remained for the Beetle Products Co. to place their product effectively on the market, and to interest manufacturers in its possibilities.

"Kamforite" for Garden and Farm

An example of the many ways in which chemistry comes incidentally to the service of industry is supplied by the chemical preparation known as "Kamforite," which is widely used on farms, gardens, and nurseries as a cleanser, fertiliser, and pest destroyer. It has been designed with a view to destroying the many insect pests that prey upon fruit trees, flowers, and vegetable crops, without destroying the bacteria whose activity is essential to the health and fertility of the soil. Its effect is both defensive and stimulating, since, while it protects plant and tree life from its natural enemies, it stimulates growth by adding nitrogen, phosphate, and potash to the existing foods in the soil. Planted below the seed or roots, it develops fumes that permeate the surrounding soil and keep it clean; sprinkled round the stems of growing plants and forked in, it isolates the plant from attack by surface insects; scattered round the trunks of fruit trees in the autumn, it destroys the larvæ of the various moths and grubs that hibernate in the earth and goes far to save next season's crop. In the treatment of that perpetual worry to all rose-growers, green-fly, it may be used in three ways—sprinkled on the ground and exposed to damp it develops fumes that rise and cause the fly to drop off, or it may be suspended in small muslin bags among the branches, or a small quantity suspended in a bag in water makes an excellent liquid insecticide, which may be sprayed in the usual way. Its action is said to be particularly active in greenhouses or other enclosures, where, sprinkled on floors or hot water pipes, it completely fumigates the atmosphere, and not merely stupefies, but kills, insect life. Already well known in this country, it has recently been introduced in Holland, under the trade name of "Carboniet," where it has proved very useful in the farming, market gardening, and bulb-growing industries. The manufacturers, Hensman Brothers, of Horncastle, have submitted to us a large number of original testimonials, which seem to leave no doubt as to the makers' claims. "Kamforite" is supplied in two qualities suitable for farm land, nurseries, gardens, and greenhouses, and it may be obtained in bulk or in small quantities in bags or tins. It is delivered in free bags, carriage paid to any part of England and Wales at fixed prices, or it may be obtained through agricultural seed and manure merchants at the same rates in any part of the country.

Company News

AYRTON SAUNDERS AND CO.—A dividend on the 7½ per cent. preference shares is payable on November 2.

AGUAS BLANCAS NITRATE CO.—The directors have declared an interim dividend on account of the year 1925 of 25 per cent., less tax, payable on November 19.

BORAX CONSOLIDATED, LTD.—An interim dividend of 1s. per share, less tax, is announced on the deferred ordinary shares in respect of the year ended September 30, 1925.

ANGLO-PERSIAN OIL CO.—The directors have decided to recommend at the annual meeting to be held on November 10 that a dividend of 12½ per cent. on the ordinary shares for the year ended March 31 last be paid, and £2,072,799 be carried forward.

PAN DE AZUCAR NITRATE CO., LTD.—A final dividend of 20 per cent. in respect of the year ended June 30 last is recommended, making a total distribution for the year of 25 per cent. It is proposed to transfer £15,000 to reserve account and carry forward £8,456.

ALUMINIUM CORPORATION.—The profit for the year ended December 31, 1924, amounts to £73,227, and, after payment of the debenture loan and mortgage interest, there is £17,666, which, with £6,323 brought forward, makes a total of £23,989, which it is proposed to carry forward.

AMERICAN CELLULOSE AND CHEMICAL MANUFACTURING CO.—The president of the company, in a circular accompanying the offer of preferred and common shares at a price which will yield to the company $1,020,000, states that the last issue of preferred stock, made in January, 1924, was for the purpose of providing funds for the construction of the company's factory at Cumberland, with a capacity of three tons of silk yarn per day. Operations at the factory began in January last, and it is stated that the factory is now capable of producing two tons per day, and with little further delay and expenditure the capacity should be brought up to three tons. Production costs, the president states, compare favourably with those of any similar factory in America, and the operating profits so far obtained, even on the smaller preliminary sales, have more than justified the estimates made when the project was undertaken. From the production of yarn the company's business is now to be extended to include the production of fabrics, and it is in order to provide funds to meet the cost of the requisite plant that the new capital is being raised.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

DRYING OILS FOR PAINT, ETC.—A commission agent in Amsterdam desires to represent British exporters of the above. (Reference No. 509.)

CHEMICALS, ETC.—An agent in Galatz wishes to represent British manufacturers in chemicals, oils and greases, india-rubber goods, and waterproof garments. (Reference No. 510.)

CENTRIFUGAL MACHINES.—An agent in Berlin-Charlottenburg wishes to represent British manufacturers of centrifugal machines, especially those used in the regenerating of oils, benzene, fats, etc. Correspondence in English. (Reference No. 523.)

INDUSTRIAL CHEMICALS, DRUGS.—An Indian firm of good standing in the Bombay Presidency wishes to represent British firms interested in the above-mentioned lines. Reference No. 492.)

DRUGS, ETC.—A British export agent who claims to be well placed to secure business in Nicaragua, British Honduras, Venezuela, Ecuador and Colombia desires to represent British firms dealing in boiled sugars, candles, drugs, fertilisers, dyes, etc. (Reference No. 513.)

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to November 21, 1925.

"ALUNDUM."

459,766. For raw or partly prepared mineral substances used in manufactures, not included in other classes. Class 4. Norton Co. (a corpoaration organised under the laws of the Commonwealth of Massachusetts), New Bond Street, Worcester, Commonwealth of Massachusetts, United States of America; manufacturers. June 16, 1925. (To be Associated. Sect. 24.)

"CRYSTOLON."

459,767. For raw or partly prepared mineral substances used in manufactures, not included in other classes. Class 4. Norton Co. (a corporation organised under the laws of the Commonwealth of Massachusetts), New Bond Street, Worcester, Commonwealth of Massachusetts, United States of America; manufacturers. June 16, 1925). (To be Associated. Sect. 24.)

"STOCKALITE."

461,557. For raw or partly prepared vegetable, animal and mineral substances used in manufactures, not included in other classes. Class 4. English China Clays, Ltd., High Cross Street, St. Austell, Cornwall; china clay producers. August 19, 1925. (To be Associated. Sect. 24.)

"COLLOMIL."

462,196. For raw or partly prepared vegetable, animal, and mineral substances used in manufactures, not included in other classes. Class 4. The Marsh Mills Trading Co., Ltd., Marsh Mills, Plympton, Devon; manufacturers and merchants. September 10, 1925.

Tariff Changes

ITALY.—Revisions have been made in the import duties on essential oils, synthetic perfumes, and alkaloid and alkaloid salts. Full lists appear in *The Board of Trade Journal*, October 15.

CANADA.—Alterations in rates under British Preferential Tariff include: Liquid glue, casein, isinglass, now 15¾ per cent.; essential oils, now 5 per cent. Copper and zinc ingots are now duty free.

AUSTRALIA.—The full text of the revised items in the new Tariff are printed in the *Board of Trade Journal* for October 22. The chemicals affected are as follows, but oils, cements, etc., are also subject to numerous alterations.

	British Preferential.	Intermediate.	General.
Acetates for the manufacture of Acetic Acid n.e.i. ..... *ad val.*	20 per cent.	30 per cent.	35 per cent.
Acetates used in the manufacture of Acetic Acid, as prescribed by Departmental By-laws *ad val.*	Free	5 per cent.	10 per cent.
Nicotine and Derris Spraying Preparations; Bromide Salts; Cyanides of Potassium and Sodium	Free	Free	Free
Hydrosulphites.... *ad val.*	Free	Free	10 per cent.
Citric Acid ..... *ad val.*	Free	5 per cent.	10 per cent.
Tartaric Acid, Cream of Tartar and Substitutes, and Phosphate of Soda per lb.	2d.	3d.	4d.
Sulphate of Magnesia, Sulphate of Soda, Hyposulphite of Soda, Hypochlorite of Soda, Carbonate of Magnesia n.e.i. *ad val.*	20 per cent.	25 per cent.	30 per cent.
Bacteriological Products and Sera	Free	Free	Free

GOLD COAST.—The revised duty on calcium carbide is now ¼d. per lb.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

RIDLEY, James F., Scholar Green, chemical manufacturer. (C.C., 31/10/25.) £28 16s. 8d. August 7.

Receiverships

GWALIA PRODUCTS, LTD. (R., 31/10/25.) E. T. Grainger, C.A., of Dowlais Chambers, West Bute Street, Cardiff, was appointed receiver on October 17, under powers contained in debentures dated January 21 and July 30, 1925.

MCLEOD (HULL), LTD. (R., 31/10/25.) W. G. Hall, of National Provincial Chambers, Hull, Accountant, was appointed receiver and manager on October 12, 1925, under powers contained in debentures dated May 2, 1922.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

BOURNE, JOHNSON AND CO., LTD., London, E.C., druggists' sundriesmen. (M., 31/10/25.) Registered October 17, £500 debentures; general charge. *Nil. December 31, 1924.

TAYLORS' DRUG CO., LTD., Leeds. (M., 31/10/25.) Registered October 16, £2,000 mortgage, to E. A. Speight Highgate, Roundhay, Leeds, contractor and others; charged on 89, High Street, Scunthorpe. *£111,744 0s. 11d. September 12, 1924.

Satisfactions

NATIONAL BY-PRODUCTS, LTD., London, W.C. (M.S., 31/10/25.) Satisfaction registered October 9, £300, part of amount registered July 7, 1922.

PEARSON (WILLIAM), LTD. (late DIGIT DISINFECTANT CO., LTD.), London, E.C. (M.S., 31/10/25.) Satisfaction registered October 21, £5,000, part of amount registered April 11, 1918.

London Gazette, &c.

Companies Winding Up Voluntarily

PEET AND CO., LTD. (C.W.U.V., 31/10/25.) P. Hodgkinson, 48, Sunbridge Road, Bradford, chartered accountant, appointed liquidator, October 19th. Meeting of creditors at The Great Northern Victoria Hotel, Bradford, on Wednesday, November 4, at 3 p.m. Creditors' claims by November 30.

LAPILAC (1919), LTD. (C.W.U.V., 31/10/25.) R. B. Petre, of Messrs. Peat, Marwick, Mitchell and Co., 11, Ironmonger Lane, E.C.2, appointed liquidator, October 19. Meeting of creditors at liquidator's offices, on Thursday, November 5, at 11 a.m.

New Companies Registered

INDUSTRIAL GASES, LTD., 34, Victoria Street, London, S.W.1. Manufacturers, sellers and buyers of industrial gases, carbide of calcium and other similar products or products arising therefrom, electro-chemical products, apparatus, etc. Nominal capital, £10,000 in £1 shares.

E. AND W. SMITH, LTD. Manufacturers and refiners of and dealers in chemicals, oils, cements, paints, varnishes, waxes, gums, raw and waste rubber, etc. Nominal capital, £5,000 in 4,000 10 per cent. cumulative preference shares of £1 and 20,000 ordinary shares of 1s. each. Solicitors: Taylor, Kirkman and Mainprice, 8, John Dalton Street, Manchester.

VISCOUS OIL AND GREASE CO., LTD., 50, Cherry Street, Birmingham. Manufacturers and dealers in oils, greases and similar materials, gelatines, glue, etc. Nominal capital, £100 in £1 shares.

Acid—Resisting Rubber

AN acid-resisting material which was previously named "Hard Rubber," and became of manufacturing importance when Hancock patented his process for the vulcanisation of rubber with sulphur in 1843, is now made under the name of "Ebonite" by the New Eccles Rubber Works, Ltd., of Eccles, Lancs. Ebonite in its purest quality is highly vulcanised rubber, and for specific purposes it may be compounded with selected mineral powders or vulcanised oils, in order to emphasise and render it more serviceable for a particular duty—e.g., acid resistance. It is claimed that Ebonite is very stable towards chemical reagents, and is unaffected by the changes of temperature that usually obtain. Being non-absorbent or porous, it can be used where metals such as lead, iron, copper, etc., are undesirable, owing to their being quickly affected by atmospheric conditions, and the material is now being employed for centrifugal machinery, hydro separators, chemical pipe lines, and in the bleaching and dye works.

French Fertiliser Trade Increasing

Exports and Imports Expanding

FRENCH trade in fertilisers showed an increase in the first six months of 1925, compared with 1923 and 1924. Imports amounted in value to 381,000,000 francs, an increase of approximately 10 per cent. and 50 per cent., respectively, compared with the two previous years. Exports at 161,000,000 francs represented an increase of 4·5 per cent. and 217 per cent., respectively.

The increase in imports is the result of the more extensive use of nitrogenous fertilisers in France in the spring. The values of this group for the period were 141,000,000 francs in 1923, 208,000,000 in 1924, and 251,000,000 in 1925. Of these totals nitrates continued to be the most important items, with values amounting to 114,000,000 francs in 1923, 154,000,000 in 1924, and 203,000,000 in 1925. The major portion of the supply of nitrate of soda was obtained from Chile, with imports of 172,000 metric tons in the first half of 1925, compared with 115,000 in 1923. Norway supplied 9,400 tons in 1925 against 1,600 tons in the first six months of 1924.

Sulphate of Ammonia Imports Decline

Receipts of sulphate of ammonia in the first half of 1923 amounted to 24,000 tons, and in 1924 59,000 tons. In 1925, however, imports declined to 48,000 metric tons, valued at 48,000,000 francs. Phosphoric fertilisers comprised about one-quarter of the total French imports of fertilisers and were valued at 82,000,000 francs. Of this last amount manufactured fertilisers, superphosphates, and composition fertilisers accounted for 7,000,000 francs. Natural phosphates have manifested a marked decline. In the first half of 1924, 707,000 metric tons were imported, but in the similar period of 1925 617,000 tons entered, while the value declined from 56,000,000 francs to 49,000,000. Morocco, Algeria, and Tunisia supply almost the entire importation of natural phosphates. Less than 3,000 tons of the 617,000 tons imported during the January-June, 1925, period came from other sources. Imports from the United States showed a marked decrease.

Chief Fertiliser Exports

More than one-third of the fertiliser export trade of France is composed of the potash salts of Alsace, sylvanite, and chloride. Their value for the first six months of 1924 reached 65,000,000 francs; and in 1925, 60,000,000. Phosphoric fertilisers approximated in value the total for exports of potash fertilisers in 1924. In 1925, however, the value of the former increased to 84,000,000 francs, of which 65,000,000 represented the 388,000 metric tons of basic slag exported. The balance of the 1925 export trade was made up, approximately, of sulphate of ammonia, 3,000,000 francs; other nitrogenous fertilisers, 5,000,000 francs; and organic fertilisers, 2,000,000 francs.